Appendices-Municipal Water Quality Investigations Program 2013-14 Work Plan

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Appendix 1. Program Element Costs FY13-14 (MWQI and SWPCA funds)

Table 1 Program Element Costs for FY13-14 Work Plan Projects

Workplan Element		Program Element	Old IO# Name	2013 Renamed IO#	Labor PY's	Labor Hours	Labor Cost	Contract costs	Operating Equip & Expenses	Total Cost	SWPCA Fund	Total Budget
5		**Water Quality Assessment**										
	5.1	Routine Monitoring Program	V20833701010	VWQASSMENT13	1.01	2090.4	$156,780	$0	$205,000	$361,780		$361,780
6		**RTDF-Comprehensive Program**										
	6.1	**RTDF-CP Real Time Monitoring**										
		6.1.1* MWQI Real Time Stations	V10093000000	VRTMONITOR13	1.38	2870.4	$215,280	$4,000	$134,328	$353,608	$32,500	$386,108
		6.1.2 Gianelli WQ Station	V20833704010	VGIANNELLI13	0.40	832	$62,400		$40,000	$102,400		$102,400
	6.2	**RTDF-CP Water Quality Forecasting**										
		6.2.1 BDO- Bay Delta Office Modeling	V10387600000	VRTBDOMODL13	1.00	2080	$218,400			$218,400		$218,400
		6.2.2 OCO- Operations Control Office Modeling	V20833706010	VRTOCOMODL13	1.00	2080	$218,400			$218,400		$218,400
		6.2.3 Model Support - Trends Analysis, modeling, rpt	V20833707010	VTRENDSAMR13	0.05	104	$7,800			$7,800		$7,800
	6.3	**RTDF-CP Information Management and Data Dissemination**										
		6.3.1 RTDF Data Dissemination & Reporting	V10387700000	VRTDDISRPT13	0.45	936	$70,200			$70,200	$13,000	$83,200
		6.3.2 Administration and Database Activities			0.00	0	$0			$0	$70,000	$70,000
7		**Science Support (Special Studies)**										
	7.1	**Watershed Sanitary Survey Action Items**										
		7.1.1 ** Data Access Improvements Project	V20833719010	VWSSACTION13	0.00	0	$0			$0		$0
	7.2	Limnology of the SWP		VLIMNOLOGY13	1.45	3016	$226,200			$226,200	$40,000	$266,200
		7.2.2 Nutrient Budget Study		VNTDYNSTDY13	0.40	832	$62,400			$62,400		$62,400
	7.3	San Joaquin River Watershed Sanitary Survey		VSJRSANSRV13	0.50	1040	$78,000			$78,000		$78,000
	7.4	FDOM Proof of Concept	V10093600012	VFDOMPOCS013	0.31	644.8	$48,360		$500	$48,860		$48,860
	7.5	Urban Sources and Loads Investigation	V10092500000	VURBANSL0013	0.15	312	$23,400			$23,400		$23,400
	7.6	O'Neill Forebay Mixing Study	V20833710010	VONEILFRBY13	0.10	208	$15,600			$15,600		$15,600
	7.7	Spectrofluorometer Study	V20833713010	VSPCTROFLU13	0.30	624	$46,800			$46,800	$2,000	$48,800
	7.8	Tidal Marsh Restoration Literature Review	V10093400011	VTIDALMRSH13	0.06	124.8	$9,360			$9,360		$9,360
	7.9	MWQI Pathogen Study write-up	V20833708010	VPATHOGEN013	0.10	208	$15,600			$15,600		$15,600
	7.10	MWQI Summary Report	V10093300011	VSUMMRYRPT13	0.05	104	$7,800			$7,800		$7,800
	7.11	CIWQS Database Search		VWWTRTPLNT13	0.10	208	$15,600			$15,600		$15,600
	7.12	Feasibility Study for MWQI Portable Monitoring Sta.	V10093100011	VPORTBLSTN13	0.05	104	$7,800			$7,800		$7,800
8		**Other MWQI Funded Program Activities**										
	8.1	Administration Work	V10092700000	VDWRRQDDPC13	1.25	2600	$195,000		$30,000	$225,000	$1,500	$226,500
	8.2	Field Unit Office Duties	V20833703010	VFUOFCWORK13	0.75	1560	$117,000			$117,000		$117,000
	8.3	O & M WQ other duties	V20833705010	VOMWQHQ00013	0.60	1248	$93,600		$500	$94,100		$94,100
	8.4	MWQI Annual Workplan	V20833715012	VWORKPLAN013	0.24	499.2	$37,440			$37,440		$37,440
	8.5	DWR Bulletin 132	V20833717012	VBULL132WQ13	0.00	0	$0			$0		$0
	8.6	MWQI Funding Agreement	V20833716012	VFUNDAGRMT13	0.00	0	$0			$0		$0
	8.7	Workplace Safety	V20833718012	VSAFTYDOCS13	0.05	104	$7,800		$2,000	$9,800		$9,800
	8.8	Emergency Response	V10387400000	V911RESPNS13	0.03	62.4	$4,680			$4,680		$4,680
	8.9	Miscellaneous meetings attended by staff	V20833719012	VOTHERWQPA13	0.27	561.6	$42,120			$42,120		$42,120
9		**Program Management-Status Reporting**	V10092200000	VPROGMMGMT13	0.80	1664	$124,800			$124,800	$84,100	$208,900
10		**Non-MWQI Funded Program Management**			0.00	0	$0			$0		$0
11		**Other Required Program Costs**				0	$0		$3,000	$3,000	$95,000	$98,000
	11.1	MEO Insurance & Fuel		G1111290005I					$1,000			$0
		Total			12.85	26717.6	$2,128,620	$4,000	$415,328	$2,547,948	$338,100	$2,886,048
		*** 6.1.1 Includes contracts with San Luis & Delta Mendota Water Authority, Area Restroom and maintenance contracts for WQ Station analyzers.**										
		**** Includes Bruce (funded by QA/QC) & Dennis' (funded by the SWPCA's) time, and 2 Sci-aids funded for 5-6 months thru UPEPA grant of $40K.**										

Table 2 MWQI Program Staff Workload Assessments for FY13-14 Work Plan Projects

MWQP Branch Staff hour's allocated to the FY13-14 MWQI Work Plan Projects			Routine Monitoring Program	MWQI Real Time Stations VRTMONITOR	Gianelli WQ Station	BDO- Bay Delta Office Modeling	OCO- Operations Control Office Modeling	Model Support- Trends Analysis	RTDF Data Dissemination and Reporting VRTDDISRPT1	Administration and Database	Data Access Improvements Project	Limnology of the SWP VLIMNOLOGY	Nutrient Dynamics Study	SJR Watershed Sanitary	FDOM Proof of Concept	Urban Sources and Loads	O'Neill Forebay Mixing Study	Spectrofluorometer Study VSPCTROFLU1	Tidal Marsh Restoration Literature Review
Staff			5.1	6.1.1	6.1.2	6.2.1	6.2.2	6.2.3	6.3.1	6.3.2	7.1.1	7.2	7.2.2	7.3	7.4	7.5	7.6	7.7	7.8
MWQI Field Section																			
	Arin Conner		478	666	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Travis Brown		478	811	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jeremy Del Cid		374	770	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Steven San Julian		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MWQI (Industrial)																			
	Sonia Miller		322	0	0	0	0	0	104	0	0	312	0	312	0	0	0	0	104
	Jason Moore		0	0	0	0	0	0	0	0	0	624	0	312	0	0	208	0	21
	Marcia Tansey-Scavone		0	0	0	0	0	104	0	0	0	416	832	0	0	0	0	0	0
	Vacant ES		0	0	0	0	0	0	0	0	0	832	0	312	0	0	0	0	0
	Shaun Rohrer		437	0	0	0	0	0	0	0	0	0	0	0	645	0	0	0	0
	Rachel Pisor		0	0	0	0	0	0	0	0	0	0	0	104	0	312	0	0	0
Water Quality Special Studies																			
	Ted Swift		0	0	0	0	0	0	0	0	0	832	0	0	0	0	0	624	0
	Mark Bettencourt		0	624	0	0	0	0	832	0	0	0	0	0	0	0	0	0	0
Non-MWQP Staff																			
O&M	Daniel Wisheropp		0	0	832	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OCO	Bryant, James, & Reza		0	0	0	0	2080	0	0	0	0	0	0	0	0	0	0	0	0
BDO	Siqing Liu, Bob Suits, Hari		0	0	0	2080	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Hours			2090	2870	832	2080	2080	104	936	0	0	3016	832	1040	645	312	208	624	125
1 PY = 2080hours/Year, PY's from PY sheet			1.005	1.380	0.400	1.000	1.000	0.050	0.450	0.000	0.000	1.450	0.400	0.500	0.310	0.150	0.100	0.300	0.060

Table 2 MWQI Program Staff Workload Assessments for FY13-14 Work Plan Projects (continued)

MWQP Branch Staff hour's allocated to the FY13-14 MWQI Work Plan Projects			MWQI Pathogen Study Write-up	MWQI Summary Report	CIWQS Database Search	Feasibility Study for MWQI	Administration Work	Field Unit Office Duties	O&M WQ Other Duties	MWQI Annual Work Plan	DWR Bulletin 132	MWQI Funding Agreement	Workplace Safety	Emergency Response	Miscellaneous Meetings Attended By Staff	Program Management-Status	Non-MWQI Funded Program	Other Required	Staff Hours	Hours per Year	PY Percentages
Staff			7.9	7.10	7.11	7.12	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9	10	11	Total	Total	Total
MWQI Field Section																					
	Arin Conner		0	0	0	104	104	437	0	0	0	0	0	0	0	0	0	0	1789	2080	86%
	Travis Brown		0	0	0	0	104	374	0	0	0	0	0	0	0	0	0	0	1768	2080	85%
	Jeremy Del Cid		0	0	0	0	208	374	0	0	0	0	0	0	0	0	0	0	1726	2080	83%
	Steven San Julian		0	0	0	0	208	374	0	104	0	0	83	0	52	832	0	0	1654	2080	80%
MWQI (Industrial)																					
	Sonia Miller		0	104	0	0	312	0	0	42	0	0	0	0	42	0	0	0	1654	2080	80%
	Jason Moore		208	0	0	0	208	0	0	42	0	0	21	62	42	0	0	0	1747	2080	84%
	Marcia Tansey-Scavone		0	0	0	0	208	0	0	42	0	0	0	0	52	0	0	0	1654	2080	80%
	Vacant ES		0	0	0	0	312	0	0	42	0	0	0	0	166	0	0	0	1664	2080	80%
	Shaun Rohrer		0	0	208	0	312	0	0	42	0	0	0	0	52	0	0	0	1695	2080	81%
	Rachel Pisor		0	0	0	0	312	0	0	104	0	0	0	0	52	832	0	0	1716	2080	83%
Water Quality Special Studies																					
	Ted Swift		0	0	0	0	104	0	0	42	0	0	0	0	52	0	0	0	1654	2080	80%
	Mark Bettencourt		0	0	0	0	208	0	0	42	0	0	0	0	52	0	0	0	1758	2080	85%
Non-MWQP Staff																					
O&M	Daniel Wisheropp		0	0	0	0	0	0	1248	0	0	0	0	0	0	0	0	0	2080	2080	100%
OCO	Bryant, James, & Reza		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2080	2080	100%
BDO	Siqing Liu, Bob Suits, Hari		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2080	2080	100%
Total Hours			208	104	208	104	2600	1560	1248	499	0	0	104	62	562	1664	0	0	26719	31200	86%
1 PY = 2080hours/Year, PY's from PY sheet			0.100	0.050	0.100	0.050	1.250	0.750	0.600	0.240	0.000	0.000	0.050	0.030	0.270	0.800	0.000	0.000	12.845	15.000	86%

Explanation of Table 1 Program Element Costs for FY13-14 Work Plan Projects

Specific Tasks to be Implemented using SWPCA Funds

The SWPCA will provide funding to provide technical support on program tasks associated with the MWQI Program:

Program Element 6.1.1 MWQI Real Time Stations

- **$32,500** allocated, if needed, for real time station and special study equipment and/or rental needs

Program Element 6.3.1 RTDF Data Dissemination & Reporting

- Consultant to provide technical expertise on the RTDF-CP Program up to **$13,000**.

Program Element 6.3.2 Administration and Database Activities

- Consultant to provide technical and managerial expertise with RTDF-CP administration, database activities, and data management support up to **$70,000**.

Program Element 7.2 Limnology of SWP

- Consultant will act as the Project Manager to provide technical and managerial expertise for the Limnology of SWP Study up to **$40,000**.

Program Element 7.7 Spectrofluorometry Study

- Consultant to provide technical expertise on the MWQI Spectrofluorometry Study up to **$2,000**.

Program Element 8.1 Administration Work/Training/TEC/MWQI

- **$1,500** allocated for staff travel costs for conferences, subject to approval by DWR management staff.

Program Element 9 Program Management/Status Reporting

- Consultant to administer SWPCA managed fund and serve as a liaison between MWQI and the SWP Urban Water Contractors up to **$75,000**. The SWPCA-MWQI Consultant will provide technical and managerial expertise on program tasks associated with the

MWQI Program. The consultant serves as a member of the MWQI-TAC, administers the SWPCA fund, and serves as a liaison between SWPCA and the MWQI Program.

- Program Management expenses including SWC staff services, legal, administration expenses, and Annual Meeting costs up to **$9,100**.

Program Element 11 Unassigned Funds

- Consultant to develop artificial neural network model, up to **$95,000**.

MWQI contracts required for FY13-14 Work Plan Elements

The MWQI Program maintains a planned budget of **$8,250** to cover the total expenses of the following contracts:

1. The contract has been extended with the San Luis Delta Mendota Water Authority that covers the cost of phone service at the Jones Pumping Plant where MWQI maintains a RTDF water quality station. The service is necessary for safety reasons since staff may be working for extended periods of time in the lower level of this working plan where their cell phones may not have service, and in case of emergency staff would need access to a working landline phone.
2. The MWQI Program maintains the contract with Area Restroom services that provides a portable toilet at the Hood RTDF WQ Station. This service is necessary since staff may be on-site for extended periods of time while calibrating the instruments and there are no other similar facilities in the local vicinity.

MWQI Operating Equipment and Expenses using the MWQI Program's Planned Budgeted Funds

Program Element 5.1 Grab Samples Collections

- **$205,000,** of which $105,000 is allotted for bi-weekly contract lab analyses, $90,000 for the van replacement, and the remaining $10,000 allocated for equipment and supplies related to the discrete monitoring program.

Program Element 6.1.1: MWQI Real Time Stations

- **$134,328** allocated for the purchase of replacement filters, miscellaneous station supplies, and analyzer specific components and service agreements.

Program Element 6.1.2: Gianelli WQ station

- **$40,000** allocated for the purchase of replacement filters, miscellaneous station supplies, and analyzer specific components and service agreements.

Program Element 7.4: FDOM Proof of Concept Study

- **$500** allocated for the purchase of quantitative standards for instrument calibrations.

Program Element 8.1: Administration Work

- **$30,000** allocated for training classes, registration fees, travel related expense, and the cost for the annual or offsite meetings. The Annual Meeting costs may include rental fees for a facility, AV equipment and technical assistance, refreshments, deposit for reserving dates and other miscellaneous meeting package elements. This budget covers the additional training expenses for new staff and promoted staff in the MWQI Program.

Program Element 8.3: O&M WQ Other Duties

- **$500** allocated for the purchase of quantitative standards for instrument calibrations.

Program Element 8.7: Workplace Safety

- **$2,000** allocated for the purchase of miscellaneous safety equipment for example, vehicle fire extinguishers and first aid kits, personal flotation devices, earplugs, safety glasses, etc.

Program Element 11. Other Required Program Costs

- **$3,000** allocated for the expenses incurred if the DWR Project Services Office staff review any MWQI project reports prior to publication. Recall that as of July 1, 2013 the Project Services Office will no longer be covered by overhead expenses and will begin charging their document review services.

- **$1,000** allocated for the expenses associated with insurance and fuel for the MWQI Program's field support sampling vehicles. Currently the Field Support Section has four vehicles in its service fleet, two vans and two trucks that are necessary to maintain the MWQI Program's continuous monitoring and support to various special studies.

Further explanation of the table 2 MWQI Program Staff Workload Assessments for FY13-14 Work Plan Projects:

The MWQI Program's staff workload assessments have gone through several revisions since their inception in late 2012. The original staff workload assessment was conducted in December 2012 to gain an understanding of how much time staff members were spending on their current assignments and special study projects. The second staff workload assessment was conducted in early 2013 to gain an understanding of how much time staff had for any new assignments or special study projects. The most recent workload assessment is a refinement of both previous staff workload assessments and is included as Table 2 of this FY13-14 MWQI Work Plan. The Table 2 staff workload assessment includes all 15 staff members that make up the MWQI Program including its program partners in the Division of Operations and Maintenance, Operations Control Office, and the Bay Delta Office.

Table 2 includes both labor hours and the PY's (1 Person Year = 2080 hours/year), per project as listed in this work plan cycle including totals and percentages, and coincides with the PY's shown in Table 1. A target of 80% of the PY percentages is due to the fact that 2080 hours/year includes time-off for annual leave, vacations, sick leave, holidays, and furlough days, and on-average a staff member is usually out-of- the-office approximately 20% per year. The project partner managers planned 1 PY knowing that their staff would only be using about 0.6PY of their time this work plan cycle which adds additional flexibility to the plan. As staff's projects progress to completion and if furloughs are not extended through this work plan cycle, this plan may require adjustments.

Appendix 2. Real-Time Data and Forecasting Comprehensive Program (RTDF-CP): Overview and Evolution

MWQI Program Background

In the early 1960's, the U.S. Public Health Service published drinking water criteria that consisted of only a few water quality parameters. These criteria remained largely unchanged for years, as the conventional wisdom of the day held that treatment of surface waters by filtration, and natural filtering of ground water by soils, along with disinfection, rendered these supplies safe for drinking. In the 1970's, improvements in scientific measurement techniques led to discovery of trihalomethanes (THMs) in U.S. drinking waters. Subsequent investigation indicated a possible link with increased incidence of cancer among exposed populations. In 1979, the Environmental Protection Agency established a drinking water standard of 100 micrograms per liter for THMs.

In anticipation of the new regulation, the Department of Water Resources (DWR) undertook a three-month investigation of organic carbon and bromide sources in Delta drinking water supplies. This study resulted in a preliminary finding that discharges from wastewater treatment plants and drainage from land surfaces contained elevated concentrations of organic carbon precursors of THMs, and that bromide was present in the system in concentrations sufficient to create bromine-containing THMs in treated drinking water. This finding led to the formation of a panel of recognized independent water quality and health scientists who were asked to evaluate information and make recommendations for further action as needed.

The panel report, published in 1981, found that most Delta water quality data then in existence was produced in support of ecological, rather than human health, concerns. The panel recommended institution of a monitoring program for constituents of human health significance, namely THM precursors, sodium, and synthetic organic pollutants such as pesticides. In 1982, DWR implemented the Interagency Delta Health Monitoring Program (IDHAMP) in satisfaction of the panel's recommendations. The IDHAMP was created as an interagency effort, and its successor remains so today. Participants have included the U.S. Bureau of Reclamation, City of Stockton, City of Sacramento, Contra Costa Water District, and

California Department of Health Services, along with State Water contractor (SWC) agencies that purvey drinking water.

Early information from the IDHAMP indicated drainage from Delta island peat soils is rich in organic carbon, therefore a separate study; the Delta Island Drainage Investigation (DIDI) was instituted. The DIDI was established to develop detailed information on the nature of this carbon source and to identify potential means of mitigating its impact on Delta drinking water supplies.

Meanwhile, advancements in analytical methodology continued, and as these were applied to environmental analysis, new Delta water quality concerns emerged. Among these were the presence of dichloro-diphenyl-trichloroethane (DDT) and polychlorinated biphenyl (PCB) in fish and sediments, selenium pollution in the San Joaquin River watershed, arsenic in the watersheds of the Delta and the State Water Project (SWP), pesticide pollution by molinate and thiobencarb (rice herbicides) and diazinon (insecticide), and waterborne pathogenic protozoa (*Giardia, Cryptosporidium*) that resist disinfection. Advancements in the analytical sciences have also led to discovery of previously unidentified disinfection by-products in drinking water supplies. Scientific data on all these and other potential water quality challenges were collected through the IDHAMP Program.

As scientific discoveries were made, there was a greater appreciation of the need for water quality information upon which to base management decisions affecting Delta water supplies. Accordingly, in 1985, the SWC requested DWR to propose a broad-based program that would provide information on known and emerging threats to drinking water quality. In 1986, DWR responded by implementing the Municipal Water Quality Investigations (MWQI) Program, that unified the IDHAMP and DIDI programs. The MWQI Program was founded on the principle that water quality concerns will continue to evolve as scientific understanding progresses, and that the program must be flexible and proactive in order to address the new water quality challenges that will continually arise.

In search of practical means of eliminating or mitigating sources of undesirable constituents, the MWQI Program has supported numerous scientific investigations into underlying mechanisms of pollution. Years of monitoring effort have established a high quality, long-term base of data documenting the drinking water quality status of the Delta, and the phenomena

that cause changes in Delta water quality. MWQI has also mobilized to monitor sudden events, such as the June 2004 Jones Tract levee breach, with subsequent analysis providing guidance for policy decisions. Data from the program have been, and continue to be used extensively in water quality and water supply studies and planning. The continually evolving integration of MWQI's data with forecasting and information dissemination tools have made possible a future in which we will be able to not only better understand the consequences of changes that occur in the Delta and SWP, but also to anticipate, communicate and, in some measure, control water quality conditions. The MWQI program is focused towards this future.

The Real-time Data Forecasting Comprehensive Program Background

MWQI water quality assessments concentrated on periodic collection of discrete ("grab") samples followed by their laboratory analysis and retrospective data interpretation. The early years of the program were primarily devoted to surveying the status of THM precursors and other water quality constituents and identifying their sources. Information derived from this work was used for water supply planning. Today, new technology allows remote, near continuous monitoring of water quality parameters such as organic carbon, bromide and other ions, along with instantaneous transmission of the data. Remote monitoring of organic carbon began at the Hood station in February, 1999, followed by the Banks station in October 2001 and the Vernalis station in January 2005. The first RTDF Water Quality Weekly Report was sent out by email in January 2004. An EC forecast for Banks Pumping Plant was added to the report in July 2004.

With these advances, the MWQI Program and the SWC realized that the tools were available to coordinate real-time data acquisition and water quality forecasting via modeling to provide water agencies and municipal operators with the information needed to make operational decisions based on imminent changes in water quality.

Up to this point, model information products were simply borrowed from other purposes. However, there was a lack of a coordination mechanism between organizations to fully realize this potential. On June 7 and 8, 2006, representatives from SWC agencies who are participants of the MWQI Program, DWR management and staff, and select outside agencies, met to discuss the concept of a RTDF-CP. The meeting focused on identifying the required

program elements, possible collaboration and the resource sharing opportunities that would allow the RTDF-CP to become reality. It was determined that if MWQI and the SWC were to effectively harness the tools to improve the efficiency of water project operations while protecting and improving drinking water quality, then the RTDF-CP must address the following considerations:

- The Delta and SWP must be more thoroughly instrumented to assure that real-time water quality data are available at all critical locations.
- A forecasting system must be created that was capable of producing water quality simulations and providing early warning and notification on a daily production basis using the existing SWP water quality forecasting model. Primarily, this would entail developing the software mechanisms to efficiently provide the necessary input data to the model, and produce a report output suitable for easy use by water managers.
- Improvement in the coordination among DWR and SWC organizations to enable smooth information flow and timely, appropriate action.

To address these needs the RTDF-CP was developed by the MWQI Program. A five-year strategic plan was developed to guide the RTDF-CP (see Appendix 5 for a copy of the 5 year strategic plan). The objectives of the 5-year strategic plan included:

- Coordinate and collaborate MWQP activities with those of other DWR Divisions under the RTDF-CP to enhance productivity, minimize duplication and overlap, and ensure effective coordination and communication to enable joint implementation of water quality assessment and forecasting activities affecting the Delta and SWP.
- Develop and refine a SWP Early Warning System that will alert MWQP participants of drinking water quality issues in a timely manner to enable preventative or corrective actions. Components of the 5 year strategic plan that support this effort include:
    - Water quality monitoring,
    - Information Management and Dissemination,
    - Water Quality Forecasting,
    - Scientific Support, and
    - Emergency Response

As envisioned, water quality sensors in the Delta tributaries (mainly Sacramento and San Joaquin rivers) provide early warning of elevated concentrations of organic carbon, bromide, turbidity, algal growth, and other water quality constituents of concern to drinking water purveyors. Movement and concentrations of these constituents would be predicted using computer forecasting models, and their actual movements tracked through other monitoring stations in the Delta. The RTDF-CP would alert water operations managers of the conditions enabling them to make operations decisions designed to mitigate water quality problems while maintaining water deliveries. Agencies using the Delta as a source of drinking water would be notified and status of the situation communicated on an ongoing basis. If elevated concentrations of constituents entered the SWP system, they could be tracked using computer forecasting and perhaps remote sensing tools, and drinking water agencies along the system could be notified when and in what concentrations the constituents were expected to appear at their intakes. Drinking water purveyors could alert water treatment plant managers who, in turn, would prepare for chemical addition or other process changes as warranted. Drinking water agencies would provide feedback to SWP operators and water quality managers to enable the full consequences of operations decisions to be understood, and this information would be acted upon to improve the early warning and operational control processes.

The geographic scope of the MWQI Program has historically been confined to the Delta, guided by the sources of constituents of concern. However, the scope of real-time monitoring and forecasting effort must, by necessity, encompass the watersheds of the Delta, the SWP, and portions of the federal Central Valley Project that are interconnected to the Delta and SWP. Implementing many of the RTDF-CP goals required coordination with staff outside of the MWQI program. Within DWR, several units have expertise and responsibilities that are necessary to operate an extensive real-time early warning and response system, including: Division of Environmental Services (Office of Water Quality, MWQI Program, Environmental Real-time Monitoring and Support), Division of Operations and Maintenance (SWP Environmental Assessment Branch, Operations Control Office, SWP Field Divisions), and Bay Delta Office (Delta Modeling Section). Therefore, in 2006, the SWC began working with the Department to create additional staff positions needed to ensure that the goals of the RTDF-CP were accomplished. In FY 2007-08 seven new positions were created within the Department and were filled by February 2008. The FY 2008-09 work plan represented the first

year where all RTDF-CP positions were filled and priority tasks associated with the RTDF-CP could be fully addressed. Currently, task coordination and oversight are being provided by an RTDF Steering Committee with participation from each involved contractor of the SWP and DWR staff members from the various participating groups.

A major, but necessary, challenge has been to develop mechanisms to integrate and coordinate among DWR programs and other agencies to achieve effective communications, standardized information formats, provide continued funding for positions in the Bay Delta Office (BDO) and Operations and Control Office (OCO) for modeling and forecasting activities, and periodically review and update programs to meet needs. The DWR Office of Water Quality was established in recognition of the need for greater linkage among existing DWR water quality programs. Expansion of the Real-time Data and Forecasting program is an example of the need and provides a mechanism to realize this coordination and integration. However, to further ensure a robust real-time water quality data and forecasting capability, long-term management commitment and funding from DWR and the SWC is essential. Eventually the RTDF-CP will need to reside organizationally where the integration of functions and resources can be best realized.

Today the MWQI RTDF-CP Program entails the following elements:

1. Coordination and collaboration between DWR monitoring and forecasting groups.
2. Real-time data acquisition for the Delta and SWP through remote, high-frequency monitoring.
3. Enhancement of forecasting and fingerprinting of drinking water quality through use of computer models.
4. Centralized information management and dissemination.
5. Scientific support studies.
6. Emergency response preparedness as related to drinking water quality.
7. Coordination and collaboration within DWR and with outside agencies to enhance real-time monitoring activities.

Besides the water quality monitoring, forecasting and data dissemination that makes up the basic components of a real-time early warning system, scientific special studies and

emergency response elements are also necessary for an early warning system. In the case of special studies, the information collected and knowledge gained are an integral part of the real-time data collection and forecasting. Special studies are conducted to investigate the origins, fate and transport, and in some cases, loads of current and emerging contaminants of concern. Such studies help to determine where new instruments should be located or guide model improvement. Special studies may also investigate seasonal patterns and trends of constituents or examine contaminant circulation patterns. These studies can also be used to refine modeling assumptions and design. Special studies can also assess the impacts of increasing urbanization on levels of water quality constituents of concern. In addition, ensuring that Departmental emergency response mechanisms include consideration of drinking water constituents is vital to an early warning system. A mechanism that can quickly notify water purveyors and operators of emergency spills and analytes that aren't modeled or analyzed in real-time will always be necessary.

The RTDF-CP consists of three interacting and complementary activities, often characterized as the three legs of a tripod: Real-time Water Quality Monitoring, Water Quality Forecasting, and Information Management and Dissemination. These three efforts are discussed below.

Current objectives for the Real-time Monitoring Program include:

- Determining baseline concentrations of organic carbon, anions, nutrients and other drinking water quality constituents in Delta and SWP waters.
- Providing water quality data relevant to SWP contractors and other users of Delta water supplies in a timely manner for decision making.
- Providing water quality forecasts that assist SWP and other utilities in advanced planning efforts to optimize management of their water supplies while meeting increasingly stringent drinking water regulations.

Real-time Monitoring

Real-time monitoring or in-situ monitoring consists of high frequency (e.g., several measurements per hour) of water quality and flow by remote, often unattended, equipment installed in locations within the Delta, its tributaries, and the SWP. Communication equipment transmits the resulting data to headquarters to be used shortly after measurements are made.

Real-time monitoring consists of two parts; a) field operations which ensure the operation and maintenance of all automated sampling equipment, timely transmission of real-time data to users and implementation and documentation of QA-QC of this data, and b) the synthesis of real-time data from a variety of federal, State and local agency water quality monitoring programs, rapid data quality control, analysis, and dissemination of results. These results are currently provided as part of the RTDF-CP via electronic reports and the MWQP website.

Real-time results are used to: a) inform operational decisions affecting the Delta and SWP, b) support development of water quality forecasting tools to help better manage SWP water supplies, and c) for water quality and water supply planning studies. In addition to DWR and the SWC, this information is used by many federal, state, and local agencies, and the public.

Today, real-time equipment is installed and maintained by MWQI at four critical Delta locations (Hood, Vernalis, Banks PP and Jones PP). A fifth station was added near Gianelli Pumping Plant in late 2011, providing carbon, anion, and other measurements in the channel between Gianelli PP and O'Neill Forebay. As water management has become more complex due to health regulations, environmental restrictions on water operations, and other factors, it has become necessary to manage the Delta and SWP with increasing precision and knowledge. This new water quality sensing technology offers a tool for better and quicker "tuning" of water operations. High frequency real-time water quality data from multiple remote locations also provides the needed information to develop and populate computer tools for fingerprinting and forecasting drinking water quality conditions in the Delta and SWP.

Within the RTDF-CP, real-time monitoring activities receive technical advice and guidance from the RTDF Steering Committee, a group of technical experts composed of staff from participating agencies. The RTDF Steering Committee serves as a subcommittee of the MWQI Technical Advisory Committee (TAC), to which the Steering Committee reports.

Water Quality Forecasting

Although water quality monitoring enables a snapshot of current and past water quality conditions, and may aid understanding of the underlying causes, it is generally inadequate to forecast and assess the water quality effects of future, or proposed, changes in the Delta and SWP. To enable future conditions to be forecasted and analyzed, the forecasting component

of the RTDF-CP uses monitoring data in conjunction with mathematical modeling techniques to develop and refine forecast data products. These efforts include providing feedback to better tailor water quality monitoring to modeling needs and to maximize the use of modeling results by water quality managers.

Models in use include DWR's Delta Simulation Model (DSM2) and the DSM2- Extension model (Aqueduct model). The RTDF-CP is also sponsoring improvements to three WARMF watershed models, which offer the potential of linking watershed hydrology to Delta tributary inputs. The geographic domain of DSM2 has been extended beyond the legal Delta to include Aqueduct model. This model includes the SWP California and South Bay Aqueducts and the Federal Central Valley Project (CVP) Delta Mendota Canal (DMC). With these tools, water quality consequences of Delta and SWP-CVP operations can be forecasted, with the objective of incorporating this information into water operations decisions for the export facilities as well as downstream purveyor's facilities. The models are being used to produce water quality forecasts on short-term (three-week) and seasonal (calendar year), as well as source water fingerprints for water volume, EC and organic carbon.

To achieve the tasks associated with modeling and forecasting requires the continued collaboration between the various DWR groups within the RTDF-CP. These groups include the MWQI Program, O&M's OCO Delta Compliance and Modeling Section, and the Bay Delta Office's Delta Modeling Section. The MWQI Program collaborates with the OCO and the BDO to accomplish forecasting tasks by developing data for simulation of historical condition and WARMF model development for the Delta and Aqueduct water quality models. This involves assembling, synthesizing, and refining the flows, EC, DOC, and bromide data necessary to define boundary conditions and simulate historical conditions. These groups meet monthly in the RTDF Steering Committee meeting and communicate as needed by phone and email.

The multiple development tasks involved in the WARMF, DSM2, and Aqueduct models are tracked using a sophisticated MS Project Gantt chart and summary task complete table. The production of the Gantt chart involves monthly updates of projects accomplishment to reach our goals. Each project has numerous predecessors, and depending on the accomplishment of these predecessors, the Gantt chart recalculates the schedule and the dates so we can see the effect of each one of the projects on the final goal. The Gantt chart generates a visual

report that builds a diagram and presents a concise report for the project management (Figure 1).

The Steering Committee also provides coordination with other efforts that have the potential for improving model accuracy. These include a study to develop improved regression relationships between EC and dissolved ions of interest such as bromide, chloride, and others.

RTDF Information Management and Dissemination

The information management and dissemination component of the RTDF-CP integrates and delivers results of the real-time monitoring, fingerprinting and forecasting elements of RTDF-CP to a wide audience of water users, scientists, and the general public. This is generally accomplished through water quality reports distributed via the RTDF web site and an E-mail subscription list to staff of agencies participating in the MWQI Program and to other interested parties. Both current and archived reports are available on the MWQI website. However, as additional needs arise that require real-time data and forecasting tools, this information will also be disseminated to stakeholders through e-mail, reports, and meetings. The goals of this program element are:

- To continue to provide meaningful and easy-to-use real-time water quality data and forecasting information to stakeholders and utilities for source water management decisions;
- To continue to develop a program for acquisition, storage, assessment, and transfer of water quality data and processed information in a near-real-time mode;
- To provide continuous, real-time postings of relevant hydrologic data, sensor data, operations, and water quality forecasts to stakeholders and utilities via the Internet in a “user friendly” format; and
- To continue to refine the format of real-time information based on stakeholder and utility needs.

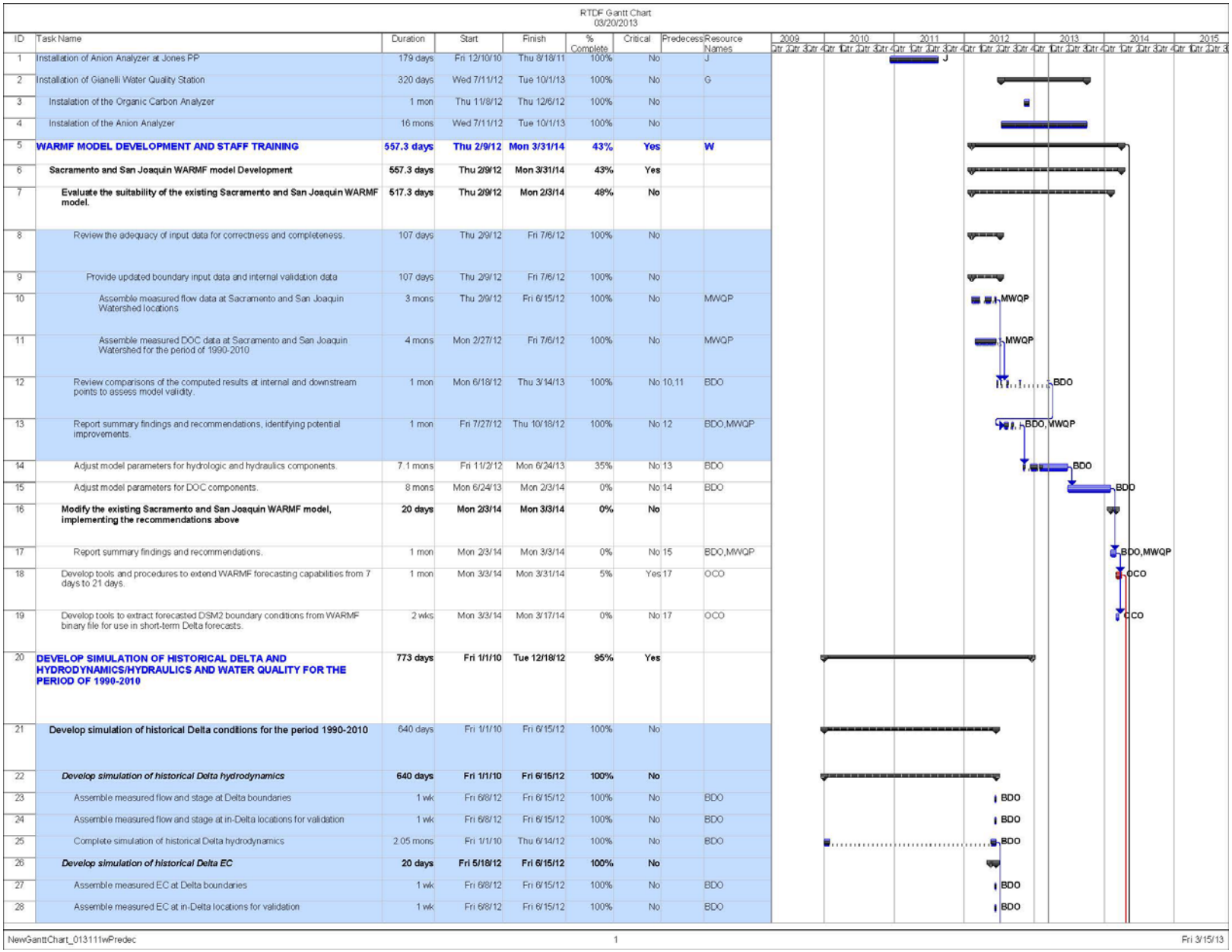
Within this component, there are information management and data dissemination tasks associated with grab sample data and with real-time data. Grab sample data –collected by the

MWQI programs are stored in the California Water Data Library (WDL) which includes data from DWR programs beyond MWQI. Real-time data from MWQI's RTDF monitoring stations are stored on a MWQI server and posted on DWR's California Data Exchange Center (CDEC) and the RTDF web site. There are plans to post quality-controlled results of the real-time data to the WDL, as well.

The database management associated with this component has gone through several evolutionary steps. These have tended towards greater information content while reducing the amount of manual attention needed from MWQI staff. Initially the data management system was an MS Access database used to generate weekly reports. The RTDF program's organic carbon data were combined with data retrieved from the California Data Exchange Center (CDEC) to produce the reports. MWQI staff then reviewed the data for accuracy, and summarized the data in graphical and text forms in the weekly reports. In FY 2007-08, the data management system was replaced by a database platform that automatically received data from real-time stations and/or CDEC as necessary. The latest phase of data management links the database with the Internet using automated graph and data table generation and presentation on a daily-updated web page, and automated email summaries. Plans are in place to develop an "on demand" capacity for users to query RTDF data such as TOC, DOC, EC, anions, and other water quality parameters from the WDL.

Changes and improvements to the data dissemination effort are decided upon by the RTDF Steering Committee. This committee provides advice and recommendations on the appearance, format, and function of web pages, reports and related media that provide access to the information produced through the project.

Figure 1. RTDF Gantt Chart



Appendix 3. Project Management Documentation

Background

The purpose of this appendix is to provide additional information on new studies that were described in the work plan. To keep the work plan clear and concise, only short summary descriptions and tables of deliverables and due dates were provided in the 2013-2014 work plan. This appendix contains the full project charters for the studies that appear in the work plan. Additionally, this work plan marks the beginning of using the Project Management body of Knowledge (PMBOK) standard of developing projects.

The PMBOK standard of designing and implementing projects is the method that DWR is now using, and MWQI lead staff will be adapting for new studies. PMBOK includes processes for initiating, planning, executing, monitoring and controlling, and closing out a project. Each stage of project development incorporates the elements of project integration, management, scope, time, cost, quality, resources, communication, risk, procurement, and stakeholder management. Utilizing the PMBOK standard will enable staff to effectively manage projects while efficiently producing deliverables within scope, schedule, and budget.

Previously, ideas for new studies used straw-man proposals that were submitted by MWQI staff and SWPCA members. These proposals were a general outline of the study idea, how the study met the needs of the MWQI mission, what resources and timeline the study would require, and the outcome or data gap that the study would fill. After these study ideas were approved by the MWQI Technical Advisory committee (TAC), the details of the study would be investigated and the study would be incorporated into the MWQI Work plan. Although the approval process for studies being incorporated into the Work plan remains the same, the format in which studies are proposed, developed, implemented and completed will change.

The new process for developing studies begins with project initiation forms, which are replacing the “straw man” proposals. These forms are shared and discussed with the TAC to determine if the study meets all of the MWQI objectives, and if there is available staff time and resources. Studies that meet the requirements will be included in the new Work plan. For studies that have a simpler study design, project charters will be created. The project charter is a document that clarifies the reason for the project, the project’s background, its scope, risks, assumptions and constraints, milestones, core team members, and budget. In cases where the project plan is not yet fully developed and that will require significant time to develop the study plan, a project initiation form will be included instead.

Studies that are ongoing from prior Work plans will not include project initiation forms or project charters. These projects will not be included in this appendix.

For continuity between this appendix and the Work plan, the sections of this appendix are broken down by Work plan section. The project management documents for this Work plan fall into “Program Elements Water Quality Assessment” and “Science Support (Special Studies)”. The initiation forms and charters are in the same order as those studies appear in the Work Plan.

DSM2 Nutrient Monitoring

State of California DEPARTMENT OF WATER RESOURCES California Natural Resources Agency

DSM2 Nutrient Study-Initiation Form

Date: 4/5/2013

Project Details

Existing Problem/Need/Opportunity: *Does something need to be fixed? Updated? Created? Expanded? Helped?*

The DSM2 model is a computer simulation of water movement and quality in the Sacramento/San Joaquin Delta. There is a nutrient modelling component to DSM2 that requires continued development. Insufficient data are available for the DSM2 Nutrient Model to be properly calibrated and produce representative results. Further model development cannot occur if high quality, node specific data are not available for use by the modelers.

Solution: *How will this project fulfill the above?*

In order to meet the data need and improve model calibration, MWQI will sample the DSM2 nodes (or similar, to be determined) monthly during the same week as our existing, routine monitoring program. At these sites, samples will be collected based on which analytes are required by the DSM2 Nutrient model.

Project Objective Statement: *What will the project do? What does it look like?*

Collect monthly water quality data from key DSM2 nodes to increase the quantity and quality of data available to improve the calibration of the DSM2 nutrient model.

Target Start Date:	7/1/13	**Target End Date:**	Reassess continued need prior to 14/15 workplan
Proposed Project Manager(s):	Steve San Julian		
Proposed Project Sponsor(s):	Cindy Garcia		

Authorization: *Specify if there is a mandated reason for project (e.g. Legislative; executive; water code, other).*

Partners

Within DWR:	OCO, BDO, MWQI
Other Agencies:	State Drinking Water Contractors
Federal Agencies:	
Local Organizations:	

Benefits and Consequences

Project is completed:	Data will be available to improve DSM2 Nutrient model calibration.
Project is not completed:	No additional monitoring will take place and DSM2 model development will have to rely on existing data.

Environmental Stewardship and Sustainability Considerations

Considerations: *Describe the process that will be used to ensure compliance with the Environmental Stewardship Policy*

There would be no negative impacts to the environment from this study, and would provide useful monitoring data in accordance with the Environmental Stewardship Policy.

Signatures

Prepared By: _____ **Date:** _____

Reviewer: _____ **Date:** _____

Project Recommended ☐ **Project Not Recommended** ☐

Reason(s):

NOTE: Once The Project Initiation document is completed and approved, please send a copy to your Division Chief and digital version sent to the Project Services Office for filing. (Even if the Initiation is not approved, please send a copy to PSO.)

DWR 9704 (New 6/11)

Cache/Yolo Complex Pre-Restoration Baseline Monitoring

State of California DEPARTMENT OF WATER RESOURCES California Natural Resources Agency

Cache/Yolo Complex Pre- Restoration Baseline Monitoring, Phase 1- Initiation Form

Date: 02/26/2013

Project Details

Existing Problem/Need/Opportunity: *Does something need to be fixed? Updated? Created? Expanded? Helped?*

Planned habitat restoration activities in the Cache/Yolo Complex will have unknown impacts to in-stream water quality and therefore, may result in additional costs to drinking water municipalities treating thru-Delta water. Currently, other DWR groups and sister agencies are looking to initiate baseline monitoring efforts as required by the FRPA agreement. The proposed FRPA monitoring program is still in the initial phase of development. It is unclear if drinking water quality concerns will be covered by the FRPA monitoring plan and when such monitoring might commence. Additionally, it is unclear what monitoring activities might already be active in the area and how tidal and watershed events may impact monitoring site selection.

Solution: *How will this project fulfill the above?*

During Phase 1, MWQI will work to ensure drinking water quality concerns are addressed in FRPA monitoring. MWQI will provide staff resources to research and define existing monitoring activities and hydrodynamic modeling in the Cache/Yolo Complex. With MWQI resources in play, the goal is to implement an appropriately scaled and designed monitoring program through existing FRPA monitoring requirements while limiting MWQI involvement in on-the-ground monitoring activities.

Project Objective Statement: *What will the project do? What does it look like?*

Work with and give momentum to FRPA to implement a water quality monitoring program that takes drinking water quality concerns into account, and that accurately defines baseline WQ conditions in the Cache/Yolo Complex prior to planned FRPA restoration efforts.

Target Start Date:	3/1/13	**Target End Date:**	At "build out" of Cache/Yolo Complex restoration (~5yrs?)
Proposed Project Manager(s):	Steve San Julian		
Proposed Project Sponsor(s):	Cindy Garcia		

Authorization: *Specify if there is a mandated reason for project (e.g. Legislative; executive; water code, other).*

Partners

Within DWR:	Mitigation and Restoration Branch, other DWR monitoring groups
Other Agencies:	Cal. Fish & Wildlife (DFG), State Drinking Water Contractors
Federal Agencies:	
Local Organizations:	

Benefits and Consequences

Project is completed:	There is a higher likelihood that drinking water quality concerns will be addressed in FRPA monitoring program and that the chosen monitoring plan will more quickly be implemented. Pre restoration water quality monitoring results will be available. With additional, post restoration monitoring the impacts of will be measurable.
Project is not completed:	The FRPA baseline monitoring program would develop without the input of MWQI and drinking water quality interests. On-the-ground monitoring activities may take longer to commence.

Environmental Stewardship and Sustainability Considerations

Considerations: *Describe the process that will be used to ensure compliance with the Environmental Stewardship Policy*

There would be no negative impacts to the environment from this study, and would provide useful monitoring data in accordance with the Environmental Stewardship Policy.

Signatures

Prepared By: _____ **Date:** _____

Reviewer: _____ **Date:** _____

Project Recommended ☐ **Project Not Recommended** ☐

Reason(s):

NOTE: Once The Project Initiation document is completed and approved, please send a copy to your Division Chief and digital version sent to the Project Services Office for filing. (Even if the Initiation is not approved, please send a copy to PSO.)

DWR 9704 (New 6/11)

State of California DEPARTMENT OF WATER RESOURCES California Natural Resources Agency

Cache/Yolo Complex Baseline WQ Monitoring, Phase 2-Project Initiation Form

Date: 2/26/13

Project Details

Existing Problem/Need/Opportunity: *Does something need to be fixed? Updated? Created? Expanded? Helped?*

Planned habitat restoration activities in the Cache/Yolo Complex will have unknown impacts to in-stream water quality and therefore, restoration efforts may result in additional costs to drinking water municipalities treating thru-Delta water. The development of a planned FRPA monitoring program, which was addressed in Phase 1 (Cache/Yolo Complex Baseline WQ Monitoring Project-Phase 1, dated 2/26/13), has either not developed quickly enough or has neglected to meet drinking water quality concerns brought forward by the MWQI program.

Solution: *How will this project fulfill the above?*

The MWQI program will refine FRPA monitoring or develop its own monitoring program to answer questions and concerns of drinking water contractors funding the MWQI program. Based on the selected monitoring program, MWQI will collect baseline drinking WQ data near the proposed restoration sites with the goal of creating a data set that will define pre-restoration water quality in the Cache/Yolo Complex. Once restoration efforts are complete a comparison between pre and post restoration water quality will be possible allowing drinking water contractors to see how restoration efforts have affected the water quality at municipal intakes.

Project Objective Statement: *What will the project do? What does it look like?*

Develop monitoring plan and conduct monitoring of analytes of concern to municipal water agencies at sites upstream and downstream from proposed Cache/Yolo Complex restoration in a manner that will allow for restoration drinking water quality impacts to be measured.

Target Start Date:	7/1/13	**Target End Date:**	At "build out" of Cache/Yolo Complex restoration (~5yrs?)
Proposed Project Manager(s):	Steve San Julian		
Proposed Project Sponsor(s):			

Authorization: *Specify if there is a mandated reason for project (e.g. Legislative; executive; water code, other).*

Partners

Within DWR:	Mitigation and Restoration Branch, other DWR monitoring groups
Other Agencies:	Cal. Fish & Wildlife (DFG), State Drinking Water Contractors
Federal Agencies:	
Local Organizations:	

Benefits and Consequences

Project is completed:	Pre restoration water quality monitoring results will be available. With additional, post restoration monitoring the impacts will be measurable.
Project is not completed:	FRPA would eventually institute a baseline monitoring program, but it may not occur on MWQI's timeline and/or may not include pertinent drinking water quality monitoring. Based on this there may not be timely pre-restoration drinking water quality data available to compare against post restoration drinking water quality.

Environmental Stewardship and Sustainability Considerations

Considerations: *Describe the process that will be used to ensure compliance with the Environmental Stewardship Policy*

There would be no negative impacts to the environment from this study, and would provide useful monitoring data in accordance with the Environmental Stewardship Policy.

Signatures

Prepared By: _____ **Date:** _____

Reviewer: _____ **Date:** _____

Project Recommended ☐ **Project Not Recommended** ☐

Reason(s):

NOTE: Once The Project Initiation document is completed and approved, please send a copy to your Division Chief and digital version sent to the Project Services Office for filing. (Even if the Initiation is not approved, please send a copy to PSO.)

DWR 9704 (New 6/11)

Science Support (Special Studies)

Nutrient Budget Study

State of California | DEPARTMENT OF WATER RESOURCES | California Natural Resources Agency

Nutrient Budget Study- Initiation Form

Date: 06/03/13

Project Details

Existing Problem/Need/Opportunity: *Does something need to be fixed? Updated? Created? Expanded? Helped?*

A number of adverse impacts occur when nutrients are present in drinking water supplies at concentrations that exceed natural background levels. Therefore, there is a need to know how nutrients are changing overtime in the Delta.

Solution: *How will this project fulfill the above?*

Study nutrients dynamics in the Delta.

Project Objective Statement: *What will the project do? What does it look like?*

Study nutrient dynamics in the Delta.

Target Start Date:	7/1/13	**Target End Date:**	
Proposed Project Manager(s):	Marcia Scavone-Tansey		
Proposed Project Sponsor(s):	Rachel Pisor		

Authorization: *Specify if there is a mandated reason for project (e.g. Legislative; executive; water code, other).*

Partners (organizations that will be benefited with this publication)

Within DWR:	Bay-Delta Office
Other State Agencies:	CalFED, CalTrans, California Department of Boating and Waterways. CDPH
Federal Agencies:	US Bureau of Reclamation, USEPA, USFWS
Local Organizations:	State Water Contractors, WARMF

Benefits and Consequences

Project is completed:	Information from nutrient trend analysis will help the DWR, the contractors, and other partners to manage nutrients in the Delta.
Project is not completed:	No information from nutrient trend analysis will be presented.

Environmental Stewardship

Policy Applicable: ☐ **Policy Not Applicable:** ☐

Reason(s):

Signatures

Prepared By: _____ **Date:** _____

Reviewer: _____ **Date:** _____

Project Recommended ☐ **Project Not Recommended** ☐

Reason(s):

NOTE: Once The Project Initiation document is completed and approved, please send a copy to your Division Chief and digital version sent to the Project Services Office for filing. (Even if the Initiation is not approved, please send a copy to PSO.)

DWR 9704 (New 6/11)

State of California DEPARTMENT OF WATER RESOURCES California Natural Resources Agency

San Joaquin River Watershed Sanitary Survey- Project Charter

Version#: 1.0 **Date:** 4-19-2013

Project Name: Write out the entire, specific name.

California State Water Project Watershed Sanitary Survey 2014 Update

Sponsor/Program Manager	Rachel Pisor
Project Manager	Sonia Miller/Jason Moore

Project Objective Statement: What must the project do? By When? Keep this statement to 25 words or less. Make it SMART (Specific, Measurable, Achievable, Relevant, and Time-based).

To complete a Watershed Sanitary Survey of the San Joaquin River Watershed by June 2014.

Triple Constraint Trade-off:

Resources	S	Select a different flexibility letter for each constraint N= Not Flexible S= Somewhat Flexible M= Most Flexible
Schedule	M	
Scope	N	

Estimated Start Date:	July 1, 2013	**Estimated End Date:**	June 30, 2014

Project Deliverables: What is the project going to produce? Create a list of tangible products that will result from project.

-Compilation of water quality data used for the analysis (spreadsheets)
-Draft Report
-Final Report (available in print, on CD, and by download from the MWQP website)
-Sections of the Reports will include:

- Executive Summary- included will be a brief account of the summary and findings of the analyses conducted, and the Action Items
- Introduction- Explanation of the purpose of the Sanitary Survey, history of the SWP Sanitary Survey, explanation of the changes in format, scope and objectives, and report organization
- Regulatory Environment- a regulatory and policy review
- Watershed Description
- Potential Contaminant Sources
- Water Quality
- Key Findings and Recommendations

Strategic Fit: What is the Strategic Initiative Identifier for this project?

The MWQP has been tasked by SWPCA to conduct a Sanitary Survey of the SWP. The State Water Contractors are required to conduct a Sanitary Survey on the SWP system every 5 years. This project will satisfy the state mandate, in part.

Customer: Who are you doing the project for?

SWPCA, CDPH

Customer Benefits: What customer requirements does this project address? Relate these to: increase revenue, avoid costs, improve service, and/ or comply with a mandate? Create a short list of customer benefits.

This project will benefit CDPH by providing information about the water quality of the San Joaquin River watershed and how the water quality of the San Joaquin affects the water quality of the SWP. It will provide valuable information

on the sources of contaminants in the watershed and on the vulnerabilities to SWP drinking water supplies. The CDPH is particularly interested in the effects of agricultural discharge and Waste Water Treatment Plant discharges. The final report will include valuable information about the effects of these sources on water quality.

Success Determination Factors: How will the success of the project be determined from the customer's perspective? Make criteria measurable so there is no doubt as to the project's success. Create a short list.

Success will be determined by a final report approved by CDPH.

Project Background: What is the primary motivation for this project? Include a brief high level description of the business area, the current situation, the desired situation, and the gaps that exist. This summary builds on your description in the Project Initiation form.

The California Surface Water Treatment Rule, administered by CDPH, requires that a Sanitary Survey be conducted on the State Water Project every 5 years. The purpose of the sanitary survey is to evaluate and document the capabilities of the water system's sources, treatment, storage, distribution network, operation and maintenance and overall management. This is to ensure a safe drinking water supply and to identify any areas that may impact the ability to provide a safe, reliable water supply.

This project marks the beginning of a new format for the sanitary survey. This format was approved by CDPH to satisfy the mandate, and consists of annual surveys. The first 4 surveys will focus on a particular topic or region of interest. The fifth survey will be a review of water quality data for the entire SWP, and will include the previous 4 surveys as appendices. This particular survey will focus on the San Joaquin River watershed. There is much interest in the effects of agricultural discharges on source water quality, and CDPH is particularly interested in the effects of WWTP and Agricultural discharges in the San Joaquin River basin. This survey will consist of analyzing water quality in the watershed, vulnerabilities to the SWP from the San Joaquin River; thereby satisfying the need to fill these data gaps.

Project Scope:

In Scope: List areas and functionality included in project.	**Out of Scope:** List areas and functionality not included in project.
• The project will consist of an analysis of water quality and vulnerabilities for the San Joaquin River watershed. • The regulatory and policy review will include background on current water quality regulations and programs that pertain to the watershed. • Description of the watershed: discussion of climate, geology, hydrology, land uses, SWP operations, a review of irrigation and water districts in the area, and background and major issues in the watershed. • Literature Review: a review of technical reports and water quality studies done in the area, and of ongoing work by coalitions and regulatory agencies. This will include CV Salts, annual reports from municipalities, agricultural coalitions and stormwater programs. • Water quality data will be collected from WDL, USGS, CDEC, CEDEN, CalPIP, the irrigated lands program, and data collected for NPDES permit compliance. The data will be collected for sites at or near the mouth, and upstream and downstream of each of the major tributaries. DWR modelers (OCO, BDO) will be consulted about models in the watershed for knowledge of sampling sites to include in the analysis. • Constituents included in the analysis: TOC/DOC, Bromide, EC, TDS, Total N, Nitrate, Ammonia, Total P, Turbidity, Pathogens (*Giardia spp., Cryptosporidium spp.*, total	The project will not include analysis of areas outside the designated boundary defined in Figure A. The project will also not include any constituents or vulnerabilities outside of what is stated in the scope.

coliforms, fecal coliform, *Escherichia coli*), Pesticides (species TBD). • Water Quality analysis: the constituents will be analyzed based on water year type, season, regulatory thresholds (TMDL, MCL), source water fingerprinting, net pumping, and comparisons between stations. • Key water vulnerabilities- analysis of major sources of contaminants in the watershed. This will focus on discharges from Agricultural lands, WWTPs, CAFOs, and urban runoff. Will also include recent spills that affected the SWP, water quality impacts from water transfers and non-SWP groundwater pump-ins, and discussion of subsidence and how subsidence may affect the integrity for the aqueduct. • Key Findings and recommendations- based on the analysis of water quality and vulnerabilities, findings and recommendations will be developed. The recommendations will be compiled into a list of Action Items that will help to guide future work of MWQI.	

Dependent Projects: What projects must be underway or completed before this project can be successful?

N/A

Risks: What characteristics or situations could cause this project to fail? Identify those items which are outside the jurisdiction of project and could result in a "show-stopper" to the project success. Create a short list.

The risk to this project is if staff is redirected to do other projects.

Assumptions and Constraints: What assumptions were made in defining project? Are there constraints to the execution of project? List assumptions and constraints.

Assumptions are that the data will be easily accessible. Other assumptions are that the OCO and BDO modelers will be able to provide insight into the effects of water quality of the San Joaquin River on the SWP, and that they will explain to the project manager what models exist on the San Joaquin River watershed so that the project manager can know what sampling sites to include in the analysis.

Constraints are that staff will be able to complete the project within the time and budget allotted.

Environmental Stewardship and Sustainability Considerations: What is the process that will be used to ensure compliance with the Environmental Stewardship Policy? Include the Environmental Stewardship Coordinator and team members (this can be roles instead of specific names)

N/A

Environmental Stewardship Coordinator:	N/A

Major High-Level Milestone Targets: What events measure progress? E.g. Initiation Approved, Analysis Complete.

Milestone	Target
Data collection completed	8-2013
Draft of Report	11-2013
Final Draft	1-2014
Final Submitted for CDPH review	4-2014
Final Report published (hard copies, and posted on MWQP website)	6-2014

Project Core Team Members:

Team Member	Phone/E-mail	Role
Rachel Pisor	916-376-9716	Program Manager
Elaine Archibald	916-736-3713	Project Partner
Sonia Miller	916-376-9712	Project Co-lead
Jason Moore	916-376-9713	Project Co-lead
Environmental Scientist (vacant)		Core Team

Charter Version Number:	
Updated By:	**Date:**
Approved By:	**Date:**

Funding Information:

Project Budget:	**$ 78,000**
Fund Center Title	
Fund Center Number	
Organization	DWR
Contact Person	
Phone/E-mail	

San Joaquin River Watershed Sanitary Survey- Project Charter

This Project Should Have: Check all that apply

Project Management Plan ■	Environmental Stewardship Plan[1] ☐	Work Breakdown Structure ☐	Communications Plan ☐	Procurement Plan ☐	Human Resources Plan ☐
Quality Management Plan ☐	Stakeholder Register ☐	Risk Register ☐	Project Budget ☐	Project Schedule ■	DWR Form 1498 ☐
Project Safety Plan[2] ☐					

[1] See WREM 58b for more information about creating an Environmental Stewardship Plan.

[2] All project Managers must take into account safety policies and procedures for projects. A safety plan should be created if needed. For more information visit the Workplace Safety Project web site.

FDOM Proof of Concept

State of California DEPARTMENT OF WATER RESOURCES California Natural Resources Agency

FDOM Proof of Concept- Project Charter

Version#: 1.0 **Date:** 3/07/13

Project Name: Write out the entire, specific name.

Fluorescence of Dissolved Organic Matter

Sponsor/Program Manager	Rachel Pisor
Project Manager	Shaun Rohrer

Project Objective Statement: What must the project do? By When? Keep this statement to 25 words or less. Make it SMART (Specific, Measurable, Achievable, Relevant, and Time-based).

Compare dissolved organic matter using a custom built sensor to DOC, TOC, and UVA at Banks Pumping Plant over the duration of one year beginning in the spring of 2013.

Triple Constraint Trade-off:

Resources	N	Select a different flexibility letter for each constraint N= Not Flexible S= Somewhat Flexible M= Most Flexible
Schedule	M	
Scope	S	

Estimated Start Date:	Spring 2013	**Estimated End Date:**	Summer 2014

Project Deliverables: What is the project going to produce? Create a list of tangible products that will result from project.

Sensor Installation
Monthly Data Downloads
Mid-Progress Report
Final Study Report of Data Comparison

Strategic Fit: What is the Strategic Initiative Identifier for this project?

The instrument being used is significantly cheaper and easier to maintain than the equipment currently being used to measure DOC and TOC.

Customer: Who are you doing the project for?

This work will be done for the Water Contractors of the SWP.

Customer Benefits: What customer requirements does this project address? Relate these to: increase revenue, avoid costs, improve service, and/ or comply with a mandate? Create a short list of customer benefits.

Data gathered can lead to instruments being placed in other locations throughout the Delta of interest to the contractors, without all of the overhead associated with building instantaneous real time stations.

Success Determination Factors: How will the success of the project be determined from the customer's perspective? Make criteria measurable so there is no doubt as to the project's success. Create a short list.

DOM will correlate with DOC with measured r-squared values of .75-.95.

DWR 9696 (Rev 5/12) Page 1 of 4

FDOM Proof of Concept- Project Charter

Project Background: What is the primary motivation for this project? Include a brief high level description of the business area, the current situation, the desired situation, and the gaps that exist. This summary builds on your description in the Project Initiation form.

Organic carbon, bromide, chloride, and salinity are all constituents of concern for drinking water purposes in the SWP. The MWQI Field unit currently maintains equipment measuring data in real time at four locations in the Sacramento-San Joaquin Delta: Banks and Jones Pumping Plants, the San Joaquin River at Venalis, and the Sacramento River at Hood. The goal of the proposed project will be to use a custom built fluorometer to measure dissolved organic matter at Banks Pumping Plant and compare those values with the DOC, TOC, and UVA values from the same station, as well as to test if there is difference between filtered and unfiltered water. A quinine sulfate solution will be used to calibrate the instrument upon initial installation, as well as once a month to test for drift in the data (if the standards are available for the projects duration). Visits to Banks Pumping Plant will have to be made monthly to administer the quinine sulfate standards, bi-weekly to clean the FDOM sensor to avoid any bio fouling, or when situations arise that emergency maintenance must be made.

Project Scope:

In Scope: List areas and functionality included in project.	**Out of Scope:** List areas and functionality not included in project.
Compare DOM with DOC, TOC, and UVA Compare values with filtered vs. unfiltered water Run certified standards monthly to test for instrument drift	Comparing DOM with any other constituent Developing an estimate of DOM values to DOC values

Dependent Projects: What projects must be underway or completed before this project can be successful?

There are no dependent projects; however it will be crucial to keep the current equipment at Banks Pumping Plant running effectively to ensure this projects success.

Risks: What characteristics or situations could cause this project to fail? Identify those items which are outside the jurisdiction of project and could result in a "show-stopper" to the project success. Create a short list.

Loss of funding for the project
No staff to finish the project
Catastrophic equipment failure

Assumptions and Constraints: What assumptions were made in defining project? Are there constraints to the execution of project? List assumptions and constraints.

Assumption: There will be adequate funding for the project in case the sensor needs repairing in mid-season and the certified standards will be readily available.

Constraint: It may be difficult to get a full year of data with no gaps.

Environmental Stewardship and Sustainability Considerations: What is the process that will be used to ensure compliance with the Environmental Stewardship Policy? Include the Environmental Stewardship Coordinator and team members (this can be roles instead of specific names)

Environmental Stewardship Coordinator:	

Major High-Level Milestone Targets: What events measure progress? E.g. Initiation Approved, Analysis Complete.

Milestone	Target
FDOM Installation	5/1/2013
Monthly Standard Administration/Maintenance	Monthly
Mid Study Progress Report	11/1/2013
Data Gathering Complete	5/1/2014
Final Study Report of Data Comparison	11/1/2014

Project Core Team Members:

Team Member	Phone/E-mail	Role
Contractors (Elaine Archibald)	736-3713	Project Partner
Shaun Rohrer	376-9710	Project Manager
Steve San Julian/Field Staff		Core Team Member

Charter Version Number:	
Updated By:	**Date:**
Approved By:	**Date:**

Funding Information:

Project Budget:	**$**
Fund Center Title	
Fund Center Number	
Organization	
Contact Person	
Phone/E-mail	

FDOM Proof of Concept- Project Charter

This Project Should Have: Check all that apply

Project Management Plan ☐	Environmental Stewardship Plan[1] ☐	Work Breakdown Structure ☐	Communications Plan ☐	Procurement Plan ☐	Human Resources Plan ☐
Quality Management Plan ☐	Stakeholder Register ☐	Risk Register ☐	Project Budget ☐	Project Schedule ☐	DWR Form 1498 ☐
Project Safety Plan[2] ☐					

[1] See WREM 58b for more information about creating an Environmental Stewardship Plan.

[2] All project Managers must take into account safety policies and procedures for projects. A safety plan should be created if needed. For more information visit the Workplace Safety Project web site.

Tidal Marsh Restoration Literature Review-Potential Study

State of California DEPARTMENT OF WATER RESOURCES California Natural Resources Agency

Tidal Marsh Literature Review, Potential Study- Project Charter

Version#: 1.0 **Date:** 4/2/13

Project Name: Write out the entire, specific name.

The affects of wetlands on drinking water quality.

Sponsor/Program Manager	Rachel Pisor
Project Manager	Sonia Miller

Project Objective Statement: What must the project do? By When? Keep this statement to 25 words or less. Make it SMART (Specific, Measurable, Achievable, Relevant, and Time-based).

Conduct multi-year study measuring drinking water quality parameters around and in freshwater tidal wetland restoration areas and report findings to the urban state water project contractors.

Triple Constraint Trade-off:

Resources	S	Select a different flexibility letter for each constraint N= Not Flexible S= Somewhat Flexible M= Most Flexible
Schedule	N	
Scope	M	

Estimated Start Date:	7/13	**Estimated End Date:**	10/16

Project Deliverables: What is the project going to produce? Create a list of tangible products that will result from project.

Yearly reports/papers
Potential journal article

Strategic Fit: What is the Strategic Initiative Identifier for this project?

Studying a restoration area while still providing drinking water – DWR level

Customer: Who are you doing the project for?

Urban State Water Contractors

Customer Benefits: What customer requirements does this project address? Relate these to: increase revenue, avoid costs, improve service, and/ or comply with a mandate? Create a short list of customer benefits.

Understanding how a specific wetland will affect drinking water quality by examining organic carbon, THMs, HAAs, nitrosamines, and nutrients.

Success Determination Factors: How will the success of the project be determined from the customer's perspective? Make criteria measurable so there is no doubt as to the project's success. Create a short list.

Summary report that shows what effects exist

Project Background: What is the primary motivation for this project? Include a brief high level description of the business area, the current situation, the desired situation, and the gaps that exist. This summary builds on your description in the Project Initiation form.

Restoration is planned in many areas of the Delta, including Prospect Island and the Cache Slough complex. The effect of wetland restoration on drinking water quality is still poorly understood, partially due to the lack of parameters studied given different wetland functions. By studying the before, during, and after impacts of a restoration wetland on organic carbon and disinfection byproducts, localized impacts can be determined.

Tidal Marsh Literature Review, Potential Study- Project Charter

Project Scope:

In Scope:	Out of Scope:
Organic carbon measurements Disinfection byproducts measurements	Chemical analysis of organic carbon Hydrology – will require outside expertise

Dependent Projects: What projects must be underway or completed before this project can be successful?

Tidal wetlands literature review white paper. Draft finished March 2013.

Risks: What characteristics or situations could cause this project to fail? Identify those items which are outside the jurisdiction of project and could result in a "show-stopper" to the project success. Create a short list.

Funding pulled
No field support for sampling
Restoration site difficult to sample/requires special equipment

Assumptions and Constraints: What assumptions were made in defining project? Are there constraints to the execution of project? List assumptions and constraints.

Funding
Location
Long term support

Environmental Stewardship and Sustainability Considerations: What is the process that will be used to ensure compliance with the Environmental Stewardship Policy? Include the Environmental Stewardship Coordinator and team members (this can be roles instead of specific names)

Not available at moment, will be determined by location selected	
Environmental Stewardship Coordinator:	

Major High-Level Milestone Targets: What events measure progress? E.g. Initiation Approved, Analysis Complete.

Milestone	Target
Pre restoration sampling	7/13
Draft paper completed	3/13
Restoration sampling	TBD
Pre-restoration results	TBD
Restoration results	TBD
Post restoration sampling	TBD
Final analysis on drinking water quality	TBD

Project Core Team Members:

Team Member	Phone/E-mail	Role
Sonia Miller		Project manager
Jason Moore		Core Team
Alex Rabidoux		Project Partner
Steve San Julian/field staff		Core Team

Charter Version Number: 1.0	
Updated By:	**Date:**
Approved By:	**Date:**

Tidal Marsh Literature Review, Potential Study- Project Charter

Funding Information:

Project Budget:	**$**
Fund Center Title	
Fund Center Number	
Organization	
Contact Person	
Phone/E-mail	

This Project Should Have: Check all that apply

Project Management Plan X	Environmental Stewardship Plan[1] ☐	Work Breakdown Structure ☐	Communications Plan X	Procurement Plan ☐	Human Resources Plan ☐
Quality Management Plan X	Stakeholder Register ☐	Risk Register ☐	Project Budget X	Project Schedule X	DWR Form 1498 ☐
Project Safety Plan[2] ☐					

[1] See WREM 58b for more information about creating an Environmental Stewardship Plan.

[2] All project Managers must take into account safety policies and procedures for projects. A safety plan should be created if needed. For more information visit the Workplace Safety Project web site.

California Integrated Water Quality System (CIWQS) Database Search

State of California DEPARTMENT OF WATER RESOURCES California Natural Resources Agency

California Integrated Water Quality System (CIWQS) Database Search- Project Charter

Version#: 1.0 **Date:** 5/21/2013

Project Name: Write out the entire, specific name.

CIWQS Database Search (DSM 2)

Sponsor/Program Manager	Rachel Pisor
Project Manager	Shaun Rohrer

Project Objective Statement: What must the project do? By When? Keep this statement to 25 words or less. Make it SMART (Specific, Measurable, Achievable, Relevant, and Time-based).

For the Delta Simulation Model 2, constituents of concern must be gathered from the CIWQS website for the modelers of the Bay-Delta Office for calibration purposes to be completed by the end of the 2013 fiscal year.

Triple Constraint Trade-off:

Resources	N	Select a different flexibility letter for each constraint N= Not Flexible S= Somewhat Flexible M= Most Flexible
Schedule	S	
Scope	M	

Estimated Start Date:	7/1/2013	**Estimated End Date:**	11/1/2013

Project Deliverables: What is the project going to produce? Create a list of tangible products that will result from project.

This project will produce data gathered from the CIWQS (California Integrated Water Quality System) website and will be used in the Delta Simulation Model 2 by the modelers of the Bay-Delta Office. The list of parameters needed will be generated by the modelers.

Strategic Fit: What is the Strategic Initiative Identifier for this project?

The Delta Simulation Model is being adjusted to accommodate changes that have taken place throughout the Delta. Gathering more recent data from CIWQS will assist the modelers in updating the DSM2 model.

Customer: Who are you doing the project for?

The project is for the water contractors as well as the Bay-Delta Office.

Customer Benefits: What customer requirements does this project address? Relate these to: increase revenue, avoid costs, improve service, and/ or comply with a mandate? Create a short list of customer benefits.

This project will relate directly to an improvement to the outputs of the Delta Simulation Model 2.

Success Determination Factors: How will the success of the project be determined from the customer's perspective? Make criteria measurable so there is no doubt as to the project's success. Create a short list.

This project will be deemed a success if all of the requested information is gathered with as few data gaps as

possible, or if missing data is filled in with a suitable replacement (like linear interpolation for example).

Project Background: What is the primary motivation for this project? Include a brief high level description of the business area, the current situation, the desired situation, and the gaps that exist. This summary builds on your description in the Project Initiation form.

The Delta Simulation Model 2 (DSM2) is a mathematical model for dynamic simulation of hydrodynamics, water quality, and particle tracking in a network of riverine or estuarine channels. The model can calculate stages, flows, velocities, mass transport processes for conservative and non-conservative constituents including salts, water temperature, dissolved oxygen, nutrients, and trihalomethane formation potential, and transport of individual particles. Thus the DSM2 provides a powerful simulation package for analysis of complex hydrodynamic, water quality, and ecological conditions in riverine and estuarine systems. The DSM2 can be used to replicate historical conditions, predict conditions for the near future, or plan for hypothetical changes in the Delta. The CIWQS database search will be conducted to supply the DSM2 modelers with an updated list of constituents that may be out of date or missing to be used for the successful running/calibration of the model.

Project Scope:

In Scope: List areas and functionality included in project.	**Out of Scope:** List areas and functionality not included in project.
CIWQS database queries of desired constituents. It may be necessary to retrieve information from other sources. Filling in missing data (data gaps) with suitable methods.	Putting the data into the model itself will be completed by the modelers.

Dependent Projects: What projects must be underway or completed before this project can be successful?

N/A

Risks: What characteristics or situations could cause this project to fail? Identify those items which are outside the jurisdiction of project and could result in a "show-stopper" to the project success. Create a short list.

Internet connections are a must to complete this project. If the connection goes down on a daily basis, then the project will not be completed.

Assumptions and Constraints: What assumptions were made in defining project? Are there constraints to the execution of project? List assumptions and constraints.

The assumption is that the data can be found on the CIWQS website. If not, it may take longer to acquire the necessary data.

Environmental Stewardship and Sustainability Considerations: What is the process that will be used to ensure compliance with the Environmental Stewardship Policy? Include the Environmental Stewardship Coordinator and team members (this can be roles instead of specific names)

N/A

Environmental Stewardship Coordinator:	

Major High-Level Milestone Targets: What events measure progress? E.g. Initiation Approved, Analysis Complete.

Milestone	Target
Delivery of constituents to the modelers	TBD

Project Core Team Members:

Team Member	Phone/E-mail	Role
Elaine Archibald		Project Partner
Shaun Rohrer	916-376-9710	Project Manager

Charter Version Number:	
Updated By:	**Date:**
Approved By:	**Date:**

Funding Information:

Project Budget:	$
Fund Center Title	
Fund Center Number	
Organization	
Contact Person	
Phone/E-mail	

California Integrated Water Quality System (CIWQS) Database Search- Project Charter

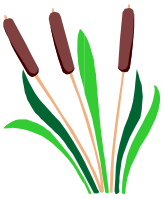
This Project Should Have: Check all that apply

Project Management Plan ☐	Environmental Stewardship Plan[1] ☐	Work Breakdown Structure ☐	Communications Plan ☐	Procurement Plan ☐	Human Resources Plan ☐
Quality Management Plan ☐	Stakeholder Register ☐	Risk Register ☐	Project Budget ☐	Project Schedule ☐	DWR Form 1498 ☐
Project Safety Plan[2] ☐					

[1] See WREM 58b for more information about creating an Environmental Stewardship Plan.

[2] All project Managers must take into account safety policies and procedures for projects. A safety plan should be created if needed. For more information visit the Workplace Safety Project web site.

Appendix 4. Sampling Sites



FY13/14
Sampling Sites and Corresponding Analyses for Municipal Water Quality Investigations (SSCA)

Revised
6/21/13

Division of Environmental Services

Municipal Water Quality Investigations

Field Section

Special Study Monitoring Schedule for 2013/14 and beyond

Aside from normal monitoring activities, the MWQI program is often involved in special studies that require additional monitoring efforts. The following is a list of the current and future special monitoring projects with anticipated initiation and completion dates:

Project and Description	Initial Monitoring Date	Final Monitoring Date
Murage Fluorescence Study Requires the collection of 40ml amber vials of filtered water at numerous locations in the Delta.	n/a	July 2013
Ted's Spectrofluorometry Study This special study requires field crews to collect 40ml vials of filtered water in addition to other analytes analyzed by Bryte Lab and Weck (THMFP's). All monitoring uses existing discrete sampling locations with the exception of two additional sites which were added specifically for this study, Banks and Jones Pumping Plants. Discrete sampling, outside of RTMQC monitoring will end at this studies completion. Also, no THMFP samples will be collected after December 2012.	n/a	completed
Colusa Basin Drain Colusa Basin Drain monitoring was originally part of the SAC WARMF monitoring project for the 10-11 WY. The data proved to be of sufficient interest that the MWQI program has added it as one of its long-term monitoring sites. Therefore, monitoring at Colusa will continue monthly, indefinitely.	October 2010	continuous
Eastside Streams WARMF and Yolo DSM2 Monitoring The Calaveras river, Mokelumne river, and Shag Slough at Liberty Island are being monitored for WARMF/DSM2 modeling purposes. These sites are to be monitored for 3 to 5 years starting from October 2010. Prior to the end of year 3, MWQI staff will meet with OCO/BDO/Systec to determine if the data collected over the first three years was sufficient to answer their questions. If not, MWQI has agreed to monitor up to an additional 2 years.	October 2010	1) October 2013 2) TBD; October 2014 or 2015
DSM2 Nutrient Monitoring New for FY13/14 workplan. In order to improve DSM2 model output, additional monitoring locations will be added to MWQI's discrete monitoring program. There is considerable overlap between this study and the "Eastside Streams WARMF…" run above so some efficiencies will be realized.	August 2013	Tbd, revisit need during development of 14/15 workplan
Cache/Yolo Complex Monitoring New for FY13/14 workplan. Cache/Yolo Complex monitoring will begin to help create a body of pre-restoration baseline water quality data for the Cache/Yolo Complex. This data will help show if restoration efforts have an impact on the quality of water received at North Bay pumping facilities and if there are affects to the lower Sacramento River system.	August 2013	Tbd, revisit need during development of 14/15 workplan
Delta Pathogen Monitoring-tbd	tbd	tbd

Delta North, Monthly-- Revised 6/21/13

Site	Analysis	Containers
South Sl.nr Hanrahan Rd B9D81543434 (DUP)	whichever site is duplicated	whichever site is duplicated
American R. @ W.T.P. A0714010	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Turbidity (59)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered
Sacramento R @ W.Sac Intake A0210451	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Turbidity (59)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered
Natomas East Main Drain @ El Camino (NEMDC) A0V83671280	Standard Mineral(1), Bromide(36) Standard Nutrients (2) TOC(66), wet oxidation DOC(66D), wet oxidation UVA Turbidity (59) As(11),Cu(16)Fe(17)Al(18)Mn(20) Suspended Solids (55)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 pint filtered (acid washed) 1 quart unfiltered
Colusa Main Drain nr. Sacramento River A0294500	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Turbidity (59) Suspended Solids (55)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 quart unfiltered
Filter Blank	As(11)Cu(16)Fe(17)Al(18)Mn(20)	1 pint, acid washed, filtered/fixed
Filter Blank	DOC(66D) oxidation	40ml clear w/acid filtered
Filter Blank	Standard Nutrients (2)	½ pint filtered

Physical Parameters collected at all sites: Temperature, pH, Turbidity, Dissolved Oxygen, and Specific Conductance

Code 1 – Standard Mineral analysis includes: Ca, Mg, Na, K, S, Cl, B, Alkalinity, Nitrate, Dissolved Solids, and Specific Conductance

Code 2 – Standard Nutrient analysis includes: Nitrate + Nitrite, Kjeldahl Nitrogen, Organic Nitrogen and Ammonia, Total Phosphorus (unfiltered), and Ortho-Phosphate

Delta South, Monthly-- Revised 6/21/13

Site	Analysis	Containers
Little Slough @ French Cut B9D42136142 (DUP)	whichever site is duplicated	whichever site is duplicated
Contra Costa Canal @ Rock Slough Fish Screen B9C75861385 (Replaces Rock Slough @ Delta Road Bridge, B9D75861372)	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Turbidity (59)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered
Old R Nr Byron (Sta 9) B9D75351342	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Dissolved As(11),Cu(16)Fe(17)Al(18)Mn(20) Total As(11),Cu(16)Fe(17)Al(18)Mn(20) Turbidity (59)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint filtered (acid washed) 1 pint (acid washed) 1 pint unfiltered
Middle River @ Hwy 4 (Union Point) B9D75351292	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Dissolved As(11),Cu(16)Fe(17)Al(18)Mn(20) Total As(11),Cu(16)Fe(17)Al(18)Mn(20) Turbidity (59)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint filtered (acid washed) 1 pint (acid washed) 1 pint unfiltered
Old River @ Bacon Island B9D75811344	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Turbidity (59)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered
Filtered Blank	DOC(66D) oxidation	40ml clear w/acid filtered
Nutrient Blank - Filtered	Standard Nutrients (2)	½ pint filtered

Physical Parameters collected at all sites: Temperature, pH, Turbidity, Dissolved Oxygen, and Specific Conductance

Code 1 – Standard Mineral analysis includes: Ca, Mg, Na, K, S, Cl, B, Alkalinity, Nitrate, Dissolved Solids, Specific Conductance
Code 2 – Standard Nutrient analysis includes: Nitrate + Nitrite, Ammonia, Organic Nitrogen and Ammonia, Total Phosphorus (unfiltered)

I5 Corridor, Bi-Weekly-- Revised 6/21/13

Site	Analysis	Containers
Johnson Sl. @ Robinson B9D75732454 (DUP)	whichever site is duplicated	whichever site is duplicated
Calaveras River @ UOP footbridge B9D75851188	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Turbidity (59) Suspended Solids (55) Chlorophyll CBOD (to contract lab) BOD (to contract lab)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 quart unfiltered 1 glass fiber filter in envelope
Cosumnes River @ Franklin Blvd?	Standard Mineral(1) Standard Nutrients(2) Chlorophyll CBOD (to contract lab) BOD (to contract lab)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 1 glass fiber filter in envelope
North Fork Mokelumne River @ Wimpy's Marina B9D81371295 (this site might be changing to an upstream site above the confluence with the Cosumnes)	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) DOC(66D) UVA Turbidity (59) Suspended Solids (55) Chlorophyll CBOD (to contract lab) BOD (to contract lab)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 quart unfiltered 1 glass fiber filter in envelope
San Joaquin River @ Vernalis B0702000	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) DOC(66D) UVA Turbidity (59) Chlorophyll Dissolved As(11),Cu(16)Fe(17)Al(18)Mn(20) Total As(11),Cu(16)Fe(17)Al(18)Mn(20) CBOD (to contract lab) BOD (to contract lab)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 glass fiber filter in envelope 1 pint filtered (acid washed) 1 pint (acid washed)
Sacramento River @ Miller Park	Standard Mineral(1) Standard Nutrients(2) Chlorophyll CBOD (to contract lab) BOD (to contract lab)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 1 glass fiber filter in envelope
Filtered Blank	DOC(66D) oxidation	40ml Clear w/acid, filtered
Nutrient Blank - Filtered	Standard Nutrients (2)	½ pint filtered

Physical Parameters collected at all sites: Temperature, pH, Turbidity, Dissolved Oxygen, and Specific Conductance

Code 1 – Standard Mineral analysis includes: Ca, Mg, Na, K, S, Cl, B, Alkalinity, Nitrate, Dissolved Solids, and Specific Conductance
Code 2 – Standard Nutrient analysis includes: Nitrate + Nitrite, Kjeldahl Nitrogen, Organic Nitrogen and Ammonia, Total Phosphorus (unfiltered), and Ortho-Phosphate
Chlorophyll – Chlorophyll a and Pheophytin a

Hood 2 Mallard, Bi-Weekly-- Revised 6/21/13

Site	Analysis	Containers
Johnson Sl. @ Robinson B9D75732454 (DUP)	whichever site is duplicated	whichever site is duplicated
Sacramento River @ Hood B9D82211312	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Turbidity (59) Dissolved As(11),Cu(16)Fe(17)Al(18)Mn(20) Total As(11),Cu(16)Fe(17)Al(18)Mn(20)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 pint filtered (acid washed) 1 pint (acid washed)
Miner Slough at Highway 84 bridge	Standard Mineral(1), Bromide(36) Standard Nutrients (28d DWR) TOC DOC UVA Turbidity THMFP/HAAFP Outside MWQI interests	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 liter glass, amber
Miner Slough below Prospect Island	Standard Mineral(1), Bromide(36) Standard Nutrients (28d DWR) TOC DOC UVA Turbidity THMFP/HAAFP Outside MWQI interests	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 liter glass, amber
Cache Slough nr. Ryer Island gaging station	Standard Mineral(1), Bromide(36) Standard Nutrients (28d DWR) TOC DOC UVA Turbidity THMFP/HAAFP Outside MWQI interests	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 liter glass, amber
Sacramento R.@ Mallard Is E0B80261551	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Turbidity (59) Chlorophyll CBOD (to contract lab) BOD (to contract lab)demand	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 glass fiber filter in envelope
Filtered Blank	DOC(66D) oxidation	½ pint filtered
Nutrient Blank - Filtered	Standard Nutrients (2)	

Physical Parameters collected at all sites: Temperature, pH, Turbidity, Dissolved Oxygen, and Specific Conductance

Code 1 – Standard Mineral analysis includes: Ca, Mg, Na, K, S, Cl, B, Alkalinity, Nitrate, Dissolved Solids, and Specific Conductance
Code 2 – Standard Nutrient analysis includes: Nitrate + Nitrite, Kjeldahl Nitrogen, Organic Nitrogen and Ammonia, Total Phosphorus (unfiltered), and Ortho-Phosphate
Chlorophyll – Chlorophyll a and Pheophytin a

Cache/Yolo Complex, Bi-Weekly—Revised 6/21/13

Site	Analysis	Containers
Little Slough @ French Cut B9D42136142 (DUP)	whichever site is duplicated	whichever site is duplicated
Shag Sl. @ LibertyIslBr (west toe drain) B9S81841416	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) DOC(66D) UVA Turbidity (59) Suspended Solids (55) Chlorophyll CBOD (to contract lab) BOD (to contract lab) THMFP/HAAFP (to contract lab)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 quart unfiltered 1 glass fiber filter in envelope
Lindsey Slough at Hastings Bridge	Standard Mineral(1), Bromide(36) Standard Nutrients (28d DWR Method) TOC DOC UVA Turbidity THMFP/HAAFP Outside MWQI interests	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 liter glass, amber
Cache Slough at Ulatis Creek	Standard Mineral(1), Bromide(36) Standard Nutrients (28d DWR Method) TOC DOC UVA Turbidity THMFP/HAAFP Outside MWQI interests	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 liter glass, amber
Sacramento Deep Water Channel (SDWC)	Standard Mineral(1), Bromide(36) Standard Nutrients (28d DWR Method) TOC DOC UVA Turbidity THMFP/HAAFP Outside MWQI interests	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 liter glass, amber
Lisbon Weir (east toe drain)	Standard Mineral(1), Bromide(36) Standard Nutrients (28d DWR Method) TOC DOC UVA Turbidity THMFP/HAAFP Outside MWQI interests	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 liter glass, amber
Filtered Blank	DOC(66D) oxidation	40ml clear w/acid filtered
Nutrient Blank - Filtered	Standard Nutrients (2)	½ pint filtered

Physical Parameters collected at all sites: Temperature, pH, Turbidity, Dissolved Oxygen, and Specific Conductance

Code 1 – Standard Mineral analysis includes: Ca, Mg, Na, K, S, Cl, B, Alkalinity, Nitrate, Dissolved Solids, and Specific Conductance
Code 2 – Standard Nutrient analysis includes: Nitrate + Nitrite, Kjeldahl Nitrogen, Organic Nitrogen and Ammonia, Total Phosphorus (unfiltered), and Ortho-Phosphate
Chlorophyll – Chlorophyll a and Pheophytin a

Real Time Monitoring QC at Hood

(Bi-Weekly)
Revised 10/10/2012

Sample Description	Analysis	Containers
Pre-maintenance Online	TOC (66) Field DOC (66D) Field	None None
River Grab	TOC (66) Bryte Lab TOC (66) Field DOC (66D) Bryte Lab DOC (66D) Field	40 mL clear vial w/acid 40 mL amber vial, 60um filtered 40 mL clear vial w/acid, filtered 40 mL amber vial, filtered
Post-maintenance Online	TOC (66) Field DOC (66D) Field	None None
CCV 5.0 mg/L Check Standard	TOC (66) Field	40ml amber vial
Filter Blank	DOC (66D) Bryte	40 ml clear vial w/acid

Three samples are manually analyzed on the Sievers field instrument on each run. These are the river grab samples, TOC and DOC; and the check standard. TOC and DOC Online values that precede maintenance are recorded as 'Pre-Maintenance Online.' The first set of post-maintenance, stable TOC and DOC data, are recorded as 'Post-Maintenance Online.' The results from all 7 are recorded on the field run data sheet.

Physical Parameters collected at site: Turbidity

Real Time Monitoring QC at Banks, Jones, and Vernalis

(Bi-Weekly)
Revised 10/10/2012

Sample Description	Analysis	Containers
Pre-maintenance Online	TOC (66) Field DOC (66D) Field Anions by IC, Field	None None None
River Grab	TOC (66) Bryte Lab TOC (66) Field DOC (66D) Bryte Lab DOC (66D) Field Anions by IC, Bryte Lab Anions by IC, Field	40mL clear vial w/acid 40mL amber vial 40mL clear vial w/acid, filtered 40mL amber vial, filtered 1 pint, filtered Pulled from container above
CCV 5.0 mg/L Check Standard	TOC (66) Field	40ml amber vial
CCV Anion Check Standard	Anions by IC, Field	None
Post-maintenance online	TOC (66) Field DOC (66D) Field Anions by IC, Field	None None None
Filter Blank	DOC (66D) Bryte Lab	40ml clear vial w/acid

Four samples are manually analyzed on the field instruments on each run. These are the river grab samples, TOC, DOC and anion; and the TOC check standard. TOC, DOC and Anion Online values that precede maintenance are recorded as 'Pre-Maintenance Online.' The first set of post-maintenance, stable TOC, DOC and Anion data, are recorded as 'Post-Maintenance Online.' Also recorded are the two previous anion check standards (CCV) from the last completed sequence. All 12 of these field instrument results are recorded on the field run data sheet.

Physical Parameters collected at all sites: Turbidity and Specific Conductance

Real Time Monitoring QC at Gianelli

(Bi-Weekly)
Revised 10/10/2012

Sample Description	Analysis	Containers
Pre-maintenance Online	TOC (66) Field DOC (66D) Field Anions by IC, Field	None None None
River Grab	TOC (66) Bryte Lab TOC (66) Field DOC (66D) Bryte Lab DOC (66D) Field Anions by IC, Bryte Lab Anions by IC, Field	40mL clear vial w/acid 40mL amber vial 40mL clear vial w/acid, filtered 40mL amber vial, filtered 1 pint, filtered Pulled from container above
CCV 5.0 mg/L Check Standard	TOC (66) Field	40ml amber vial
CCV Anion Check Standard	Anions by IC, Field	None
Post-maintenance online	TOC (66) Field DOC (66D) Field Anions by IC, Field	None None None
Filter Blank	DOC (66D) Bryte Lab	40ml clear vial w/acid

Four samples are manually analyzed on the field instruments on each run. These are the river grab samples, TOC, DOC and anion; and the TOC check standard. TOC, DOC and Anion Online values that precede maintenance are recorded as 'Pre-Maintenance Online.' The first set of post-maintenance, stable TOC, DOC and Anion data, are recorded as 'Post-Maintenance Online.' Also recorded are the two previous anion check standards (CCV) from the last completed sequence. All 12 of these field instrument results are recorded on the field run data sheet. (Add something about SONDE QC.)

Physical Parameters collected at all sites: EC, TEMP, DO, Turbidity and Specific Conductance

Colusa Basin Rice Drainage-- Revised 9/23/11

(To be samples weekly during ~Aug-Oct rice drainage period,
a few weeks before peak drainage and a few weeks after.)

Site	Analysis	Containers
South Sl.nr Hanrahan Rd B9D81543434 (DUP)	whichever site is duplicated	whichever site is duplicated
Colusa Main Drain nr. Sacramento River A0294500	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Turbidity (59) Suspended Solids (55)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 quart unfiltered
Filtered Blank	DOC(66D) oxidation	40ml Clear w/acid, filtered
Nutrient Blank - Filtered	Standard Nutrients (2)	½ pint filtered

Physical Parameters collected at all sites: Temperature, pH, Turbidity, Dissolved Oxygen, and Specific Conductance

Code 1 – Standard Mineral analysis includes: Ca, Mg, Na, K, S, Cl, B, Alkalinity, Nitrate, Dissolved Solids, and Specific Conductance
Code 2 – Standard Nutrient analysis includes: Nitrate + Nitrite, Kjeldahl Nitrogen, Organic Nitrogen and Ammonia, Total Phosphorus (unfiltered), and Ortho-Phosphate

WARMF, Storm Event-- Revised 12/04/12

(To be sampled during 4 storm events during wet season)

Site	Analysis	Containers
Johnson Sl. @ Robinson B9D75732454 (DUP)	whichever site is duplicated	whichever site is duplicated
Calaveras River @ Brookside Road B9D75851208	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Turbidity (59) Suspended Solids (55) Chlorophyll	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 quart unfiltered 1 glass fiber filter in envelope
Shag Sl. @ LibertyIslBr B9S81841416	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Turbidity (59) Suspended Solids (55) Chlorophyll	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 quart unfiltered 1 glass fiber filter in envelope
North Fork Mokelumne River @ Wimpy's Marina B9D81371295	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Turbidity (59) Suspended Solids (55) Chlorophyll	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 quart unfiltered 1 glass fiber filter in envelope
Filtered Blank	DOC(66D) oxidation	40ml Clear w/acid, filtered
Nutrient Blank - Filtered	Standard Nutrients (2)	½ pint filtered

Physical Parameters collected at all sites: Temperature, pH, Turbidity, Dissolved Oxygen, and Specific Conductance

Code 1 – Standard Mineral analysis includes: Ca, Mg, Na, K, S, Cl, B, Alkalinity, Nitrate, Dissolved Solids, and Specific Conductance
Code 2 – Standard Nutrient analysis includes: Nitrate + Nitrite, Kjeldahl Nitrogen, Organic Nitrogen and Ammonia, Total Phosphorus (unfiltered), and Ortho-Phosphate
Chlorophyll – Chlorophyll a and Pheophytin a

Real Time Data Monitoring
Station Instrument Metadata

Updated 3/26/13

=decommissioned

Install Date	Decommission Date	Station	Instrument	Instrument Serial No.
2/9/1999	5/16/2005	Hood	Sievers 800	Sievers 800
5/20/2005	Active	Hood	Sievers 900/5310	0503-0470
4/12/2002	5/9/2011	Hood	Shimadzu 4100	38116318
2/13/2001	7/5/2010	Banks	Shimadzu 4100	38D15281
7/5/2010	Active	Banks	Shimadzu 4100	38116313
1/20/2005	Active	Banks	Dionex DX-800	4070455
3/10/2005	9/18/12	Vernalis	Shimadzu-4110	41D05061
4/27/2005	9/18/12	Vernalis	Dionex DX-800	4100811
1/13/2009	Active	Jones	Shimadzu 4110	42216173
8/30/2010	5/31/2012	Jones	Metrohm IC850	1872006004105
3/9/2012	Active	Gianelli	Sievers 5310	10094242
6/6/2012	Active	Gianelli	Metrohm IC850	1872006004105
6/13/12	Active	Jones	Dionex 2100	
9/18/12	Active	Vernalis	Sievers 5310	12035577
9/28/12	Active	Vernalis	Dionex 2100	
8/28/12	Active	Jones	Sievers 5310	12035564
10/29/12	Active	Banks	Sievers 5310	12035605
10/29/12	Active	Banks	Dionex 2100	
3/9/12 (need to confirm)	Active	Gianelli	YSI Sonde 6600-V2	10F 100050

Appendix 5. MWQI 5 Year Strategic Plan

During the 2012-2013 fiscal year, the five-year strategic plan for the MWQI Program was updated, approved and adopted by the MWQI Technical Advisory Committee. This strategic plan will serve as the basis for the MWQI Program for completing development of program work plans for 2012-2013, and subsequent years. The plan that was approved is reproduced below.

Introduction

The Municipal Water Quality Program (MWQP) Branch consists of four sections: Municipal Water Quality Investigations (MWQI), Water Quality Special Studies, Field Support, and Quality Assurance/Quality Control (QA/QC) sections. Three of these sections, the MWQI, Water Quality Special Studies, and Field Support sections, constitute the MWQI Program funded by the State Water Project Contractors Authority MWQI Specific Project Committee (MWQI-SPC) with an annual budget of $3.1 million. The QA/QC Section is funded by SWP funds with an annual budget of $607,000. The five-year strategic plan for the MWQI Program covers the sections included in the MWQI Program and the QA/QC Section.

MWQP Branch Mission Statement

To enhance the Department’s mission of managing the water resources of California by supporting the efforts of the Department's Divisions and outside agencies to benefit the State’s people through water quality monitoring for drinking water purposes in an economic, reliable and environmentally sound manner while taking steps to protect, restore, enhance, and sustain the Delta's natural environments.

MWQI Program Mission Statement

The mission of the MWQI Program is to: a) support the effective and efficient use of the Sacramento-San Joaquin Delta (Delta) and the State Water Project (SWP) as a source water supply for municipal purposes through monitoring, forecasting, and reporting water quality; b) provide early warning of changing conditions in source water quality used for municipal purposes; c) provide data and knowledge based support for operational decision-making on the SWP; d) conduct scientific studies of drinking water importance; and e) provide scientific support to DWR, the State Water Project Contractors Authority MWQI-SPC, and other governmental entities.

Organizational Structure, Coordination, and Funding

- Work within DWR to develop an organizational structure that ensures staffing requirements for the MWQI Program are met on a timely basis through the retention of highly qualified personnel that have the expertise to meet MWQI Program objectives.
- Continue developing and implementing the Real Time Data and Forecasting-Comprehensive Program (RTDF-CP) which encompasses tasks identified by the MWQI-SPC, MWQP staff, and DWR management, as high priority and achievable through cooperative effort.
- Work with the MWQI-SPC to identify tasks that can most efficiently be performed through cooperative agreement, and participate in cooperative implementation of such tasks. These tasks will be described in detail and planned for on an annual fiscal year basis in the MWQP Work plan.
- Work with the MWQI-SPC to identify funding needs that will enable the MWQP to be adequately implemented, and to participate in acquiring, allocating, and accounting for, funds to accomplish needed work as stated in the annual work plans.
- Coordinate and collaborate MWQP activities with those of other DWR Divisions under the RTDF-CP to enhance productivity, minimize duplication and overlap, and ensure effective coordination and communication to enable joint implementation of water quality assessment and forecasting activities affecting the Delta and the SWP.

Development and Refinement of a SWP "Early Warning System" for Water Quality Concerns

- As they pertain to the responsibilities of the MWQP Branch, and in conjunction with the Division of Operations and Maintenance (O&M), and as one of the primary objectives of the RTDF-CP, develop and refine a "SWP Water Quality Early Warning" system that will alert MWQI Program participants of likely drinking water quality problems in a timely manner to enable preventative or corrective actions to be taken to avoid consumer impacts.
- Work collaboratively with other DWR Divisions to develop efficient communications among DWR Divisions and MWQI Program participants to ensure early warning information is transmitted, received, and acted upon as they pertain to the responsibilities of the MWQP Branch.
- Tasks identified under the "Water Quality Monitoring", "Information Management and Dissemination", "Water Quality Forecasting", "Scientific Support" and "Emergency Response"

program elements support the development of this early warning system as they pertain to the responsibilities of the MWQP Branch.

Water Quality Monitoring and Emerging concerns

- Monitor water quality parameters relevant to drinking water at key locations in the Delta through periodic collection of discrete samples and their analysis by field and laboratory instruments, according to accepted methods.
- Monitor upcoming plans for habitat restorations required under current and future Biological Opinions and any projects developed as part of the proposed Bay Delta Comprehensive Plan. Develop and implement all necessary monitoring programs to establish baseline information prior to the construction of any restoration projects, during construction of the projects and during the implementation of those projects.
- Maintain existing *in-situ* multi-parameter water quality monitoring stations on the Sacramento River at Hood, H.O. Banks Delta Pumping Plant Headworks, Jones Pumping Plant, San Joaquin River near Vernalis, and on inlet to Gianelli Pump/Generation Plant.
- As part of RTDF-CP work cooperatively with the MWQI-SPC, other DWR units, and other agencies, to identify additional key locations in the Delta, its tributaries, and the SWP where additional *in-situ* water quality assessment equipment is needed. Work cooperatively with others to acquire needed permits, plan for and perform construction, acquire monitoring and communications equipment, bring new stations into operation, and assure the quality of data produced.
- Perform water quality assessments and evaluations to identify drinking water quality consequences of physical or operational changes in the Delta, its watersheds, and the SWP.
- With participation of the MWQI-SPC, other MWQI Program participants, and DWR modelers, produce annual re-evaluations of the discrete and *in-situ* monitoring programs to identify and recommend needed changes to eliminate critical data gaps, provide valid data for the DSM2 model, improve program efficiency and minimize monitoring costs.
- Ensure timely and appropriate QA/QC of water quality and related information produced by the MWQI Program. Take timely and effective action to identify and correct QA/QC problems. Include equipment/instrument maintenance and calibration as part of the annual QA/QC process.
- As part of the RTDF-CP work with QA/QC Section staff to standardize the QA/QC procedures, especially for new stations.

- Continue to explore new and improved technologies for acquiring real time water quality data. Utilize new technology where possible to minimize monitoring costs and data gaps and to move towards standardization of monitoring methodology.
- Work collaboratively with O&M to plan for emerging constituents of concern such as “Taste and Odor” issues that have been increasing with time. Respond to these emerging concerns in a timely manner as part of the RTDF-CP.
- As part of the RTDF-CP, work collaboratively with O&M to develop a comprehensive program of monitoring, early warning, and management for algal growths in the Delta and SWP having the potential for causing taste and odor in treated drinking water taken through the SWP. Governance of this program will be through a steering committee composed of DWR staff from relevant organizational units, and MWQI-SPC representatives of affected agencies.

Information Management and Dissemination

- Provide timely analysis, interpretation, and dissemination of monitoring information to MWQI Program participants and other identified stakeholders on key constituents of concern. Analyze and present monitoring results to program participants and in public proceedings.
- Continue to develop and refine capability for MWQI Program participants to rapidly acquire real-time and other drinking water quality data and supporting information through the internet in user-friendly formats.
- Produce annual data and/or interpretative reports documenting program findings, as shall be determined by the MWQI Technical Advisory Committee (TAC).
- Continue production of weekly water quality reports, with continuing improvements, as may be directed by the MWQI TAC.
- Provide technical assistance to MWQI Program participants in acquiring needed water quality data and supporting information.
- Research and develop new and innovative means of communicating MWQI Program work products to program participants and other interested parties.
- Encourage and promote actions by regulatory agencies necessary to ensure a high-quality and reliable water supply by disseminating information derived from the MWQI Program.
- Advocate drinking water quality protection by tracking new projects in the Central Valley, including operational planning activities, by alerting MWQI Program participants to projects having the potential to affect the quality of drinking water supplies taken through the Delta,

reviewing and commenting on environmental documents, and participating in public hearings and workshops.

- Maintain awareness of findings from international, national, and regional research activities that have a bearing on the ability to meet future drinking water regulations, factor these findings into analyses of Delta water quality conditions and facilities options as appropriate, and communicate these findings to MWQI Program participants.

Water Quality Forecasting

- Produce timely water quality forecasts for MWQI-SPC members. MWQI Program staff will support DWR modeling efforts by providing water quality expertise needed to improve Delta models, coordinating closely with modelers to collect data to support model development and to improve the ability to interpret and apply model outputs.
- The Bay-Delta Office (BDO) will continue development of the WARMF models for the Delta watersheds. The Operations Control Office (OCO) will be responsible for modeling water quality forecasts.
- MWQI staff should endeavor to become experts at interpreting how Delta watersheds influence Delta drinking water quality. We encourage staff to develop a scientific understanding of the Delta watersheds by becoming proficient with the Watershed Analysis Risk Management Framework (WARMF) model as this will help to develop such an expertise.

Scientific Support Studies

- In cooperation with MWQI Program participants and as part of the RTDF-CP, identify the need for, and implement detailed studies to examine specific phenomena that affect, or may in the future affect, Delta drinking water quality. These studies may be generally classified as follows:
    - Detailed evaluations of problem areas or conditions identified as a result of monitoring activities.
    - Evaluations of drinking water quality consequences of proposed physical or operational modifications in the Delta and its tributaries, its inflows, internal flow patterns, or outflows.
    - Prediction of the drinking water quality consequences of population growth patterns.
    - Detailed evaluations of natural processes that have the potential to affect the quality of Delta drinking water sources.

Detailed evaluations of point and non-point pollutant discharges to the Delta (including tributaries to the Delta). Studies will be selected for implementation based on their significance to the quality of drinking water supplies taken through the Delta, likelihood of being able to apply the information to attain higher quality of Delta drinking water sources, cost and availability of MWQI staff resources. Outside expertise will be enlisted where necessary and feasible to conduct or collaborate on scientific studies.

Emergency Response

- Identify, to the extent possible, ahead of time specific concerns regarding these events and what constituents would need to be assessed.
- Develop scenarios for different emergency events using models to determine which areas in the Delta pose most significant drinking water quality issues.
- Develop emergency response plans ahead of time (follow SIMS template), identifying funding and staffing needs, all participating groups and their roles.
- Work with other DWR units (i.e. O&M and Flood Management) to develop emergency response plans.
- Encourage DWR Executive to treat these events similar to flood events.
- Perform water quality assessments and evaluations in response to emergency situations, such as Delta levee breaks, supplying timely water quality information to emergency decision makers and public health authorities.
- During emergency circumstances, work cooperatively with emergency managers and rapidly communicate results of emergency water quality assessments the MWQI Program may be tasked to perform.

Sanitary Survey

- Follow-up and resolve items identified in the Action Plan for the Watershed Sanitary Survey, 2011 Update.
- Coordinate efforts of the California Department of Public Health, MWQI staff and the MWQI-SPC to implement procedures to produce annual Sanitary Survey reports that would provide a more manageable and productive means of meeting the intent of the Sanitary Survey regulatory requirements. The annual Sanitary Survey reports would be combined into a 5-year update as required in the regulations.